

The Mount David Summit

The Mount David Summit is an annual celebration of student research, artistic work, and community-based scholarship at Bates College. Each year students from all classes present their work to each other and to faculty, staff, family, and community members in a symposium format at the end of the winter semester. The Summit spotlights the rich and varied academic activities of Bates students across the disciplines and honors the vibrant intellectual life of the college.

Named for the landmark "mountain" on the campus, the Summit is guided by the motto of the college

—*Amore ac Studio*—

loosely translated, With Love and Zeal, With Ardor and Devotion:
devotion to scholarship, creativity, and the life of the mind.

The Mount David Summit is sponsored by the Office of the Dean of the Faculty. We are grateful to Ralph T. Perry '51 and Mary Louise Seldenfleur, who have been generous and devoted supporters of the Summit since its first year.

~ About the 2017 Summit ~

The 2017 Mount David Summit, held on March 31, features the research, creative work, and performances of students from all Bates classes. It is organized into four sessions, three in the afternoon and one in the evening. The summit program is published in this booklet; students' abstracts are available in a separate booklet or on the Web.

The faculty believes that all Bates students are developing as scholars in their own right, and are ready to articulate and defend their ideas in a public forum. The college's major programs of study, and especially the senior thesis/senior project requirement, are designed both to prepare students and challenge them to conduct original research and contribute to our knowledge of the world. Many students who present their work at the Mount David Summit are senior thesis writers, approaching the summit of their academic career at Bates. Their presentation—which might be a research poster, a short talk, or a video documentary—represents hundreds of hours of work, remarkable commitment to their studies, and a synthesis of all that they have learned at Bates. Other presenters are at different points in this journey; they may be first-years just beginning to explore ideas in depth, or they may be sophomores or juniors in the process of developing the skills and insights that will serve their thesis work in the future. The artists who participate in the summit—the poets, fiction writers, essayists, dancers, actors, ceramic artists, and photographers—bring to their work a combination of technique, cultural and intellectual context, ways of thinking and seeing the world, and raw talent that is nurtured in a liberal arts environment.

The kind of individualized education celebrated at the Mount David Summit would not be possible without the unflagging dedication of faculty advisors. Bates faculty work one-on-one with seniors on the thesis; in this process they are both demanding and supportive, guiding research methods, thoughtful interpretation, and effective writing. Many Bates staff members—assistants in instruction, lab technicians, writing and quantitative reasoning specialists, museum curators, theater designers, digital media specialists, librarians and archivists, and community-engagement staff—also work closely with student-scholars. These members of the Bates community offer students a wide range of skills and expertise.

~ ABSTRACTS ~

(in alphabetical order)

Alexa Adams '17

Credit Culture and Caterpillar Fungus: Examining the Local Economy of the Tarap Valley in Dolpa, Nepal, through an Anthropological Lens

Tina Mangieri, Office of Off-Campus Study, advisor

The Tarap Valley in the Dolpa district of Nepal has only recently experienced the influences of a modern, cash-based economy in full force. Historically, the economy in Tarap was almost entirely rooted in agriculture, animal husbandry, barter, and exchange. While these practices are still important foundations of the economic systems in the valley, the introduction of *yartsa gunbu*, a highly valuable "caterpillar fungus" used in Chinese medicine, has transformed the economy of the region. By propelling the community into a consumer-oriented and cash-based economy, *yartsa gunbu* has changed people's lifestyles, perceptions of wealth, and overall attitudes.

Zofia Ahmad '19, Hannah Austin '19, Isabella

Barrengos '19, Andrew Cahill '18, Shelbie

McCormack '19, and Jenna Powell '19

Presenting the World: Geographical Narratives from the Ancient World

Hamish Cameron, Classical and Medieval Studies, advisor

Classical geography was not merely interested in geophysical or topological descriptions of space. Geographical writers of ancient Greece and Rome described the world they inhabited in nearly every sense, from the personal to the anthropological, the mythic to the historical, the political to the fantastic. This panel investigates six regions of the ancient world as imagined (and sometimes seen) by ancient geographers and examines how Greek and Roman geographical writers represented the varied spaces of their world within their narratives.

Anan Ahmed '17

Island Identities in Disjuncture: Local Forms of Sociopolitical Critique in the Maldives

Loring Danforth, Anthropology, advisor

Island communities are experiencing a rapid depopulation of rural areas. In both the Maldives and the Shetland Islands, local identities rooted to the land are being challenged by the economic policies of these states. As a result, communities are being physically and culturally uprooted by economic necessity. Kate McNally and Anan Ahmed discuss the ways in which people from Shetland and the Maldives use nostalgia as a form of sociopolitical critique. They draw on research done for their respective anthropology honors theses about the Shetland Islands and the Maldives.

Melody Altschuler '17

Theory of Mind Profile of School-Aged Children with Autism Spectrum Disorder

Kaitlin White, Psychology, advisor

Impairments in social functioning in autism spectrum disorder (ASD) are theoretically linked to an underlying deficit in theory of mind (ToM), the social cognitive ability to take another's perspective. Previous research has consistently documented ToM impairments in preschoolers with ASD, but investigations of ToM in school-aged children with ASD and average IQ have produced mixed results. The present study examined the pattern of individual differences in ToM in school-aged children with ASD and average IQ using a battery of ToM measures. Overall, this research has important implications for understanding task-related differences in ToM and elucidating the heterogeneity in social functioning and social cognition in school-aged children with ASD.

Matthew Ameduri '19 and Liam McLoughlin '19

An Invisible Predicament: Wabanaki Healthcare

Joseph Hall, History, advisor

Health disparities have plagued Native Americans since European arrival. Today, the cumulative results of displacement and assimilation have led to extreme healthcare inequality among native populations in our backyard. With a focus on the Wabanaki Nation of Maine, this project considers the approaches to mending health disparities: increased federal funding of Indian Health Service, a better sense of historical trauma, and increased support for traditional healing practices.

Garrett Anderson '18

Visual Culture and Stereotypes of the Ainu of Northern Japan

Tina Mangieri, Office of Off-Campus Study, advisor

Beginning in the seventeenth century, the Ainu people of Northern Japan had their lands taken by the Japanese government and were forced to assimilate, damaging their culture and identity. Today, a rebirth of Ainu culture is underway, and awareness is spreading; in 2007 the Japanese national government finally acknowledged the Ainu as an indigenous people of Japan. Many Ainu have joined the tourism industry, creating "village museums" that tourists may visit and experience Ainu culture. This ethno-tourism, alongside popular culture, provides a way for many to better understand Ainu visual and cultural history.

Alexander Andonian '17

Data-driven Approaches for Investigating Molecular Heterogeneity of the Brain

Jason Castro, Neuroscience, advisor

Although the spatial heterogeneity of the early olfactory circuitry has long been recognized, we know comparatively little about the circuits that propagate sensory signals downstream. Investigating the potential modularity of the bulb's intrinsic circuits relies on identifying differential gene expression, or "molecular signatures," that may demarcate functional subregions. In the proposed work, we test the hypothesis that the bulb's intrinsic circuits are parceled into distinct, parallel modules that can be defined by genome-wide patterns of expression. In pursuit of this aim, our deep-learning framework will facilitate the group-registration of the mitral cell layers of ~ 50,000 in situ olfactory bulb circuits.

Hannah Austin '19 – see Zofia Ahmad '19

Presenting the World: Geographical Narratives from the Ancient World

Hamish Cameron, Classical and Medieval Studies, advisor

Madelyn Auvinen '17

Importance of the Inflammatory Response in Linking Periodontal Disease and Diabetes Mellitus

Pamela Baker, Biology, advisor

Diabetes is the most widespread chronic disease in the world. It is characterized by the body's inability to produce enough insulin for the body to use, or the inability of the body to properly use the insulin that has been produced. In both type 1 and type 2 diabetes, there is a clear genetic predisposition that is triggered by environmental or lifestyle factors. Chronic periodontitis is the most common chronic inflammatory disease in humans and one of the most common diseases of the mouth. It is characterized by the destruction of dental bone and the connective tissue due to an inflammatory response, preceded by subgingival bacterial infection. A clear biochemical linkage exists between diabetes and periodontal disease, which was initially studied in the 1990s. In 1990, researchers investigated the incidence of periodontal disease in the Pima Indian population in Arizona, which is known to have the highest incidence of diabetes in the world. Within this pilot study, it was found that there was an increased risk of periodontal disease for those with diabetes. About a decade later, in 2001, it was found that treatment of periodontal disease can improve diabetic glycemic control. In the early to mid-2000s, new knowledge of the inflammatory response started to connect these two diseases together. It was previously thought chronic inflammation of the mouth, which occurs in periodontal disease, was localized to the mouth, but this inflammation was systemic. Subsequent studies have investigated the inflammatory response, cytokines involved in the connection between periodontal disease and diabetes, and the effects of periodontal treatment on the chronic inflammatory response.

Isabella Barrengos '19 – see Zofia Ahmad '19

Presenting the World: Geographical Narratives from the Ancient World

Hamish Cameron, Classical and Medieval Studies, advisor

Hanna Bayer '17

Interdependence and Compassion: Connecting Buddhist Ethics and Western Feminist Theory

David Cumiskey, Philosophy, advisor

My thesis explores the connections between Buddhism and Western feminist theory. At the most general level, I seek to examine what ethics say about the human condition. Specifically, I wish to focus on what Buddhist ethics tell us about what humans are looking to get out of their lives, and how they find the best way to achieve it. I am looking to connect this with feminist theory because both Buddhist ethics and feminist ethics reflect the human need for a happy life, with as little suffering and oppression as possible.

Kate Berger '17

Predicting Emotional Responses to Social Exclusion: Immune Neglect, Emotion Regulation, and the Moderating Role of Dysphoria

Helen Boucher, Psychology, advisor

Previous research suggests that in response to negative events, people fail to recognize that their psychological immune system will lessen the impact of this event on their emotional experience (i.e., immune neglect). As a result, people inaccurately forecast more intense and longer lasting negative emotions than they actually experience. Evidence shows that dysphoric individuals may be especially impaired in affective forecasting ability. Thus, the current study is focused on the link between dysphoria and immune neglect, and whether dysphoric individuals are less accurate in their predictions of future affect and use of emotion regulation strategies in response to social exclusion.

Abbey Bierman '17

Effects of Multiple Species' Songs Playback on Song Learning in the Carolina Wren in a Rehabilitation Setting

Ryan Bavis, Biology, advisor

It is known that the Carolina Wren, a small songbird, must learn its song within the first three months of its life. However, less is known about whether individuals can learn their song from a CD playing the songs of multiple species. This study used orphaned Carolina Wrens from the Blue Ridge Wildlife Center, a wildlife rehabilitation facility in Virginia, to compare the spectrograms of songs of birds who listened to the CD with birds who had no additional enrichment. It was found that the addition of a CD was not beneficial to the birds' learning process.

Niccolò Bigagli '17 and Aashu Jha '17

Nonlinear Dynamics of Vertical-Cavity Surface-Emitting Lasers (VCSELs) Subject to Optical Injection and Feedback

Hong Lin, Physics, advisor

This study investigates nonlinear dynamics in a vertical-cavity surface-emitting laser subject to optical injection and

feedback. The objective of our work is to identify the perturbation conditions at which different instabilities occur. Nonlinear dynamics were observed under different optical injection schemes: single and dual beam optical injection in both parallel and orthogonal polarization directions were introduced into single and dual mode operation regime of the VCSEL. Dynamics maps in parameter space of injection power and frequency detuning are plotted for each scheme. The study also thoroughly explores dynamical features triggered in response to a combination of injection and feedback.

Matthew Bodwell '18, Owen Cardwell-Copenhaver '18, Danielle Cohen '19, Marisol Hernandez '19, and Ryan Whittemore '19

The Comparative Politics of Climate Change

James Richter, Politics, advisor

Climate change is a global problem. A solution will require the active participation of a majority of the world's sovereign states, but not every state has shown an equal commitment. Cooperation is further complicated by the fact that those who have contributed the most to the problem are not necessarily those who suffer most as a result. In this panel, students from Politics 236, the Global Politics of Climate Change, examine the politics of climate change in five different countries: Bangladesh (Hernandez), Brazil (Cardwell-Copenhaver), China (Whittemore), Egypt (Cohen), and Japan (Bodwell). These include some countries that have contributed most to the problem as well as some that have the most to lose. Each panelist will summarize briefly the politics of one country, including the country's greenhouse gas emissions and where they come from, the likely impact that climate change can have their problem, the country's current policy, and the internal politics that support that policy.

Milan Brankovic '17

A Survey of Adaptive Quadrature Methods

Katharine Ott, Mathematics, advisor

Numeric integration is the process of finding the approximate value of the integral of a function. Only in a relatively small number of cases can the integral be evaluated analytically and numerical methods are therefore needed. Adaptive quadrature is a numeric integration method that aims to minimize the computational cost of the approximations while still achieving the desired accuracy. In this thesis we review several methods of adaptive quadrature and develop new methods of adaptive quadrature by refining algorithms found in the literature. The numerical integration techniques are then compared against one another and ranked according to accuracy and efficiency.

Max Breschi '18 and Creighton Foulkes '17

Collaboration of Ash Glazes Applied to Ceramic Pots

Susan Dewsnap, Art and Visual Culture, advisor

The shape and form of ceramic work is unique to each artist. Adding to the individuality of a piece is the application of glaze prior to the kiln firing. As ceramic artists at Bates, we have been lucky to work with, collaborate with, and learn from many other talented artists. This presentation exhibits a collaboration between Creighton Foulkes and Max Breschi, to showcase the

creation of our pottery and the development of ash glazes. Wood ash glazes are made with simple ingredients, but allow for a highly variable surface on each pot. This installation showcases our work and lends insight into the ceramic process.

Tristan Brossy de Dios '17

Creative Thesis Reading: Discothèquesque

Jessica Anthony, English, advisor

My stories blur the line between reality and fantasy, entwining elements of the mystical and macabre with modern obsessions of fact vs. fiction. From a train ride to sell the frozen head of Osama bin Laden to an indoctrination into a nihilistic prison cult, the events of my stories often appear unlikely or altogether impossible. However, my vision for my work centers on real characters in outlandish scenarios: despite the improbability of the story, I guarantee that given the proper circumstances, freakish things can become reality.

Alex Brown '17

Synthesis of the O-mannose Linked Human Natural

Killer-1 (HNK-1) Epitope

Jennifer Koviach-Côté, Chemistry, advisor

Glycosylation is a post-translational change that occurs in approximately 50% of proteins. Through this process, a cellular coating called the glycocalyx is created that serves many critical biological roles. Studies have found that O-mannosylated glycoproteins play a role in nervous system development, particularly the Human Natural Killer-1 (HNK-1) epitope. One unique feature of HNK-1 is a terminally sulfated Glucuronic Acid (GlcA) group, which is also common to drugs such as chondroitin and heparin. My goal is to synthesize sulfated GlcA and combine it with the other monomers of HNK-1 to create a full synthesis of this carbohydrate for later study.

Claire Brown '17, Yarisamar Cortez '17, Halie Lange '17, Molly Pritz '17, and Katherine Stevenson '17
Knowledge and the Public Good: Exploring Intersections of Theory and Practice

Darby Ray, Harvard Center for Community Partnerships, advisor

In community-engaged research, students undertake the creation of knowledge in collaboration with a community partner for the purpose of addressing a community need or interest. This year's Community-Engaged Research Fellows worked on diverse projects situated at the intersection of community interests and academic areas including sociology, environmental studies, politics, and peace and conflict studies.

Claire Brown '17: *Adult Drug Courts and the Development of the Carceral State in Maine*

Yarisamar Cortez '17: *Case Study of Organizational Power of Female Lime Agriculturalists in Rural Oaxaca, Mexico*

Halie Lange '17: *Creating a Pilot Education Program for Thornecrag Bird Sanctuary*

Molly Pritz '17: *Data Analysis of the St. Mary's WorkMed Occupational Medicine Integrated Disability Prevention Program*

Katherine Stevenson '17: *Intersections of Mental Illness and Legislative Changes in Androscoggin County Jail*

**William Browns '17
*The Synthesis of GalNAC in the Total Synthesis of M3 Glycans***

Jennifer Koviach-Côté, Chemistry, advisor

The glycoalkaloid contains a variety of glycans that coat the surface of cells and is responsible for many biological processes. These different glycans influence particular biological processes such as cell-cell adhesion, cell differentiation, and bacterial infection. O-mannosylated glycans have been found to be linked directly to cancer, multiple sclerosis, and many other diseases. The M1, M2 O-mannosylated glycans have already been studied, but the M3 O-mannosylated glycans (Man-GlcNAc-GalNAc-Rbo5P-(Xyl-GlcA) have not. In this study, GalNAc was synthesized as a building block to ultimately prepare the M3 glycan through automation.

**Madeline Bruno '17
*Quantifying the Effect of Fluorine on the Viscosity of Silica-undersaturated, Alkali-rich Melts in the NaAlSiO₄-KAlSiO₄ Series***

Geneviève Robert, Geology, advisor

We studied the effect of up to 2.15 wt.% fluorine on the viscosity of (Na,K)AlSiO₄ melts, which are analogs for natural alkali-rich magmas. We measure viscosity, or the resistance to flow, at temperatures of 680-945°C using parallel-plate viscometry. Fluorine reduces the viscosity of all melts studied. The reduction is greater at intermediate Na:K ratios. The viscosity reduction is smaller than for melts with higher silica content. Quantifying the relationship between physical properties and chemical structure in melts helps us understand the structural role of fluorine within magma and has applications including the continued refinement of volcanic forecasting.

**DeAundre Bumpass '17
*Reducing Microbial Populations on Fresh Produce Using Suma Eden***

Lee Abrahamsen, Biology, advisor

Bacteria and other microbes are introduced to the food we consume through numerous avenues such as soil, water, and food handlers. Pathogenic microorganisms have been associated with fresh or processed fruits and vegetables and have been linked to disease outbreak. Fresh produce is not subjected to cooking methods that kill off these harmful microbes therefore synthetic and biological surfactants are employed. Biological surfactants are widely used in numerous food service settings to remove microorganisms from the surfaces of fruits and vegetables because they have low toxicity, renewable origins, and are biodegradable. Suma Eden was applied to whole lettuce, tomatoes, and cucumbers using the "faucet method" followed by a qualitative and quantitative analysis via summation of colonies present before and after application. Information gathered from this study will be presented to

Bates Dining Services to assist the staff in assessing the measures taken to meet food safety standards.

**Audrey Burns '17
*A Thesis in Acting: Helena in A Midsummer Night's Dream***

Martin Andrucki, Theater, advisor

The presentation of a thesis project in acting, including dramaturgical research and an analysis of William Shakespeare's comedy, *A Midsummer Night's Dream*, with particular emphasis placed on the study of the character Helena. This thesis features extensive character work and rehearsal of the role of Helena as experienced over the course of several months. The project culminates with the performance of Helena as part of a fully cast, staged, and costumed production of *A Midsummer Night's Dream* for a run of five consecutive days. This poster will feature pictures and research of the thesis.

**Ted Burns '19, Sofie Gardephe '18, Claudia Krasnow '18, Danielle Ward '20, and members of English 222, Seventeenth-Century Literature: Early Women's Writing; Interdisciplinary Studies 255, Modern Japanese Women Writers; and Spanish 315, Latin American Women Writers
*Reading Women's Writing: England, Japan, and Latin America***

Stephanie Pridgeon, Spanish; Joanna Sturiano, Japanese; and Myra Wright, English advisors

This session brings together students in three courses who have been examining women's writing in a range of global contexts: England, Japan, and Latin America. In addition to their distinct linguistic and geographical delineations, the three courses focus on different time periods, from early modernity to the present. In a series of "introductions," representatives from each class will share a brief text by an author from their curriculum, and report on their colleagues' responses to a question that is at the heart of our courses: What are the political implications of studying women's writing exclusively? In the discussion that follows, students will share observations and questions about how gender categories participate in decisions about what and how we read. The session allows the audience as well as students in the three courses to learn about particular modes of inquiry, discuss points of convergence and divergence in their approaches to literature, and suggest new ways of framing women's writing.

**Spencer Burt '17
*Effectiveness of Cognitive Stress Reappraisal in Mediating Test Anxiety among College Students***
Kaitlin White, Psychology, advisor

Test anxiety in college students is widespread, possibly affecting up to 35% of college students. Test anxiety can inhibit a student's ability to perform to their potential on an exam in multiple ways including decreased working memory capacity, decreased recall of consolidated memory due to increased cortisol as a result of increased stress, decreased attentional control, and cognitive awareness of physiological symptoms of anxiety. This study examined one strategy used to decrease test anxiety: cognitive stress reappraisal. The study measures the effects of cognitive

stress reappraisal on cognitive and physiological levels of test anxiety.

Andrew Cahill '18 – see **Zofia Ahmad '19**
Presenting the World: Geographical Narratives from the Ancient World
Hamish Cameron, Classical and Medieval Studies, advisor

Andrea Cardenas '17
Prism-based Optical Fingerprint Scanners
Travis Gould, Physics, advisor
Optical prism fingerprint scanners provide an important form of biometrics used to identify individuals. A prism-based optical fingerprint scanner configuration is explored using a geometrical optics approach. By utilizing the predictable properties of light, total internal reflection (TIR) can be spoiled by bringing another higher-index object (finger) into near-contact with the medium that contains light. The ridges (convex lines on the surface of a fingerprint) are the area of contact that diffuse incident light, while the valleys (concave parts of the surface of a fingerprint) continue to satisfy total internal reflection conditions, which is detected by the camera. Using a prism, laser, and camera, I experimentally verify that an optical fingerprint scanner can be achieved by utilizing total internal reflection.

Owen Cardwell-Copenhaver '18 – see **Matthew Bodwell '18**
The Comparative Politics of Climate Change
James Richter, Politics, advisor

Olin Carty '17
The Effect of Fluorine on Melt Viscosity in Jadeite-Leucite Melts
Geneviève Robert, Geology, advisor
We synthesized glasses along the jadeite-leucite ($\text{NaAlSi}_2\text{O}_6$ - KAlSi_2O_6) join with various amounts of dissolved fluorine (up to 1.88 wt.%) and measured the viscosity of each melt by parallel-plate viscometry at temperatures between 655°C and 980°C. The addition of fluorine decreases the viscosity of each melt relative to its F-free equivalent. In naturally occurring melts, this decrease in viscosity aids in the movement and transport of magma. By increasing the flow rate of magmas, the addition of fluorine can also aid in the eruption of volcanoes that previously were too viscous to erupt and possibly lead to larger outflows than previously expected.

Kelsey Chenoweth '17
Methane Emissions above and below a Local Ditch Plug in Sprague River Marsh, Phippsburg, ME
Beverly Johnson, Geology, advisor
This study investigates methane emissions behind a ditch plug installation in the Sprague River Marsh, Phippsburg, ME. Ditch plugs are common man-made tidal restrictions that restrict tidal flow in marshes. Previous work has shown that increased methane emissions are often associated with tidal restrictions. Static gas chambers were used to collect air samples above and below the ditch plug which were analyzed using a GC-FID. Data showed no statistical difference in methane emissions above or below the ditch

plug concluding that the presence of the ditch plug did not result in increase in methane emissions on the marsh.

Hanna Chipman '17, Sofia Gnabasik '17, Tara Humphries '17, Meghan Lynch '17, Gabriella O'Leary '17, and Julia Yankelowitz '17
Contemporary Social Issues: Sociological Perspectives
Emily Kane, Sociology, advisor
In this panel, sociology thesis researchers address a variety of contemporary social issues, explored in the context of their connections to key social institutions including education, law, the family, public policy, and inequalities of gender, race, class, sexuality, and nation.

Hanna Chipman '17: Identity Negotiation: The Experiences and Intersections of East Asian American Youths

Sofia Gnabasik '17: Introversion-Extraversion and the Constitution of an Activist

Tara Humphries '17: Community Perspectives on Childhood Adversity, Trauma, and Family Dysfunction

Meghan Lynch '17: From Milking to Maintaining: Best Practices for Housing Code Enforcement in Lewiston

Gabriella O'Leary '17: Perceptions of Muslim Women: The Origin and Variation of Stereotypes among Students at Bates College

Julia Yankelowitz '17: Misconceptions of Bilingualism: Unpacking the Over-Diagnosis of Spanish-Speaking English Language Learners as Learning Disabled and Speech and Language Impaired

Maitri Chittidi '17
Shattering the Granite Ceiling: An Examination of Women's Electoral Success in New Hampshire
Leslie Hill, Politics, advisor
New Hampshire stands out as an anomaly for both its historically high number of women elected to its state legislature and its current all female, all Democratic delegation to Congress. What accounts for New Hampshire's distinctiveness? This presentation examines factors such as district magnitude and political party recruitment to determine their impact in women's electoral success.

Lisa Choi '17
Researching Research: Examining Perspectives, Planning, and Execution of Community-based Research Projects at Bates College
Emily Kane, Sociology, advisor
What does community-involved research look like under the backdrop of a liberal arts college that has received the prestigious Community Engagement Classification from the Carnegie Foundation for the Advancement of Teaching? This study provides insight into how professors at Bates plan and guide undergraduate students who choose to conduct community-involved research projects, and the different types of projects students have conducted through their own independent study or class projects.

Soohee Choi '17

The Effect of Group-Level Uncertainty on the Choice of Brand-Name vs. Generic Products

Helen Boucher, Psychology, advisor

People can compensate with feelings of uncertainty through consumer choices. In Study 1, because more collectivistic people are known to prioritize groups, I hypothesized that collectivists' choice of brand-name products, which represent a more positive social image, would be more affected by a group-level uncertainty manipulation than less collectivistic people. While the effect of collectivism was not found, people in the group-level uncertainty versus certainty condition chose more brand-name options. In Study 2, we extend Study 1 by measuring collective self-esteem instead of collectivism, and include questions about the meaning of the group-level uncertainty manipulation (e.g., feeling out of control).

Gina Ciobanu '17

Elementary Aspirations Programs: Bridging the Gap for Underserved Students

Georgia Nigro, Psychology, advisor

Aspirations programs have the goal of bridging the achievement gap in underserved schools for students who are often low-income, first-generation, or minority students. These programs provide support necessary to aid in the transition from schooling to post-secondary opportunities. Aspirations work is often focused at the high school level, failing to address the need for programming before the teenage years. This study focuses on aspirations work in the Lewiston community at the elementary school level. After reviewing the literature on K-6 aspirations, a program was developed and implemented in a local after school program. An evaluation of the program was a focus of this thesis.

Students in Classical and Medieval Studies/History 283, Rome and the East: Digitizing and Communicating History

Rome and the East: Digital Projects on the Roman Near East

Hamish Cameron, Classical and Medieval Studies, advisor

Roman expansion is a story of culture contact that fundamentally altered not only the conquered and contacted people, but the Romans themselves. In this interactive demonstration/exhibition, students from Classical and Medieval Studies/History 283, Rome and the East: Digitizing and Communicating History, share their digital approaches to history, including a number of case studies of the political, cultural, and material interactions that resulted from Roman expansion into the Near East in the first century BCE and Roman rule over the region for the subsequent centuries. The students discuss the digital components and reflect on the role of digital tools in scholarship and public engagement.

Grace Clunie '17

Examining the Role of Colorblindness in Students' Attitudes toward Race and the Criminal Justice System at Bates College

Michael Rocque, Sociology, advisor

Colorblind racism suggests that race is no longer a factor in

discrimination or inequalities while subtly furthering the mission of pre-civil rights racism: to confine racial minorities to the bottom of social, political, and economic hierarchies. White students at predominantly white colleges and universities are often not aware of, and are under no pressure to acknowledge, their white privilege. This study examines the role of colorblindness and white privilege in the attitudes of white students at Bates College by examining student responses to race-related issues and their opinions on harsh policies pertaining to the United States criminal justice system.

Danielle Cohen '19 – see Matthew Bodwell '18

The Comparative Politics of Climate Change

James Richter, Politics, advisor

Mallory Cohen '17 and Laura Pietropaoli '17

Senior Theses in Dance: Text, Relationships, and Creative Processes in Performance

Rachel Boggia, Dance, advisor

In this session Laura Pietropaoli and Mallory Cohen present the outcomes of investigations made in collaborative creative processes this semester. The goal of using text-driven movement to convey unique human experiences links together these two thematically different works.

Claire Coleman '17

Kingdom Animalia: Clinical Applications of Animal-assisted Therapy and the Human-Animal Interaction

Todd Kahan, Psychology, advisor

You don't have to be a pet owner to acknowledge the indescribable connection between human and animal. The human-animal interaction is a transcendent correspondence with the potential of making fruitful synergies. We live in a world that thus far has been reliant on the exploitation of animals, often failing to recognize the bidirectionality of comparative practices. Instead of using nonhuman animals as a model of human function, let's identify animal functioning and then apply it to human function: analogize the homologies. Drawing on anthrozoology, the purpose of this thesis is to examine the human-animal relationship and how animal-assisted therapy (AAT) affects human emotion regulation, with a focus on the mesolimbic pathway and human brain reward circuitry in dysregulation.

Matthew Collie '17

Bidirectional Communication and Neuropeptide Modulation between Buccal A Cluster Neurons and Feeding Central Pattern Generator Neurons in the Pond Snail, *Helisoma trivolvis*

Nancy Kleckner, Biology, advisor

The triphasic feeding rhythm of the pond snail, *Helisoma trivolvis*, is controlled via a self-sustaining circuit of neurons known as a central pattern generator (CPG). In response to internal and external cues, the circuit will alter firing rate and sequence to execute alternative behaviors. For instance BAC neurons, which lie outside the CPG, can initiate a state of satiation through transition from regurgitation. Furthermore, the effects of BAC neurons may be modulated by the release of the neuromodulator NPF. To characterize bidirectional communication between circuit components, standard dual channel

electrophysiology was used to simultaneously record activity in both cell groups.

Charlie Colony '17

Experiments with the Periodic Equatorial Beta Plane

Jeffrey Oishi, Physics, advisor

My thesis is on computational astrophysics and simulates convective behaviors on the sun using the equatorial beta plane. The equatorial beta plane is a mathematical formula for representing the Coriolis force at the equator of a planet or sun. The sun creates localized nests of zonal convection at the equator, which may be responsible for the generation of magnetic fields that propagate from the sun's surface. My thesis includes Python scripts to be run on Bates' high performance computing cluster, which will simulate these localized nests to gain a better understanding of the sun's generation of magnetic fields.

Yarisamar Cortez '17 – see Claire Brown '17

Knowledge and the Public Good: Exploring Intersections of Theory and Practice

Darby Ray, Harvard Center for Community Partnerships, advisor

Chris Crum '17, Rosy DePaul '17, Samantha Grant '18, Grace Jurkovich '18, Amy Katz '17, Ariscell Tavarez '17, and Matthew Winter '18

Off-Campus Study: Homestays while Abroad

David Das, Office of Off-Campus Study, advisor

Almost 80 years ago, Thomas Wolfe famously asserted that "you can't go home again." Yet, every year, Bates students choose to live in homestays while abroad. Why is the pull of "home" so strong? What induces students to invest time and energy into their abroad family? Our panel of study-abroad veterans will discuss the many facets of the homestay experience and how it contributed to their lives abroad.

Isobel Curtis '17

Forest Composition and Eastern Hemlock Physiology at the Bates-Morse Mountain Conservation Area in Response to a Pathogenic Insect, Hemlock Woolly Adelgid

Brett Huggett, Biology, advisor

Hemlock woolly adelgid (*Adelges tsugae*, or HWA) is an invasive insect responsible for widespread eastern hemlock (*Tsuga canadensis*) mortality in the Northeastern United States. HWA infestation was discovered at the Bates Morse-Mountain Conservation Area in the spring of 2015. Current research aims to assess the extent of HWA infestation, quantify eastern hemlock's physiological response to infestation, and anticipate changes in forest composition post-hemlock decline. Results will inform potential management strategies, serve as a baseline for continued monitoring of HWA spread and hemlock decline, and strengthen understanding of the mechanism with which HWA induces hemlock mortality.

Marcus Delpeche '17

Implicit Perception in Object Substitution Masking: An Examination of Lexical vs. Semantic Activation

Todd Kahan, Psychology, advisor

Four-dot object substitution masking (OSM) is a form of

visual masking that involves presenting a target object surrounded by four dots for a brief period of time. If the dots disappear with the target then visibility of the target is high. However, if the offset of the dots is delayed, participants are unable to identify the target. The current study examines whether unconsciously seen target words affect reaction times along with the level (lexical vs. semantic) these words are processed in the brain.

Rosy DePaul '17 – see Chris Crum '17

Off-Campus Study: Homestays while Abroad

David Das, Office of Off-Campus Study, advisor

Marina Dickson '17

The Effect of Domestic Politics on Korea-Japan Relations

James Richter, Politics, advisor

Japan and South Korea share much in common: their stances on terrorism, global climate change, and other international issues mostly align. They both share strong alliances with the United States as well as a general anxiety about nuclear proliferation in the Democratic People's Republic of Korea. Their economic relations are stable and mutually beneficial. Despite commonalities, however, Korea and Japan have trouble establishing stable relations due to territorial disputes and historical tensions. This presentation will explore the uniqueness of the Japan-Korea relationship through the presentation of polling data to explain how aggravations on the micro level hinder cooperation between the two governments.

Nathan Diplock '17

Comparing the Pollinator Abundance and Diversity Supported by Native and Non-Native Ornamental Plants within Four Genera

Carla Essenberg, Biology, advisor

As pollinator decline continues to gain public attention, groups of concerned citizens across the United States are trying to increase the amount of pollinator habitat through gardening. Planting native ornamentals is often advertised as the most effective practice for gardeners interested in supporting pollinators. We compared the amount and diversity of pollinators observed visiting native plant species relative to non-native plant species within the same genus. Overall, our results suggest that native plants grown in southern Maine gardens do support a greater amount and diversity of pollinators compared to non-native plants.

Jade Donaldson '18

Role of the Locus Coeruleus in Cocaine Memory Reconsolidation

Nancy Koven, Neuroscience, advisor

Environmentally induced relapse to cocaine seeking requires the retrieval of context-response-cocaine associative memories. These memories become labile when retrieved and must undergo reconsolidation into long-term memory storage to be maintained. Previous studies have shown that beta-adrenergic receptor stimulation by norepinephrine (NE) in the basolateral amygdala (BLA) is required for memory reconsolidation. Here, contributions of NE and beta-adrenergic receptors to memory reconsolidation were examined using an instrumental model. When propranolol, a beta-adrenergic antagonist, was infused into the BLA immediately following cocaine

memory destabilization, decreased reinstatement of cocaine-seeking behavior was observed. This result suggests that cocaine memory reconsolidation is disrupted by propranolol administration. The main source of NE to the BLA is the locus coeruleus (LC). Consequently, regions of the BLA innervated by the LC were identified and phenotyped also. Together, the findings of this investigation provide preliminary data for future experiments involving the manipulation of specific projections between the LC and the BLA in an effort to further map memory reconsolidation circuitry.

Tayla Duarte '17

Investigating the Neural Dependence of Caudal Fin Regeneration in Zebrafish (Danio rerio)

Nancy Kleckner, Biology, advisor

Human epidermal growth factor receptor 2 (HER2) is a protein found responsible for cell proliferation, including the proliferation of breast cancer cells. Many HER2 inhibitors are currently being studied for anti-cancer therapies. Here we want to continue the investigation of the neural dependence of caudal fin regeneration in zebrafish (*Danio rerio*) by introducing various HER2 inhibitors to their nervous systems. Like many cancer therapies, HER2 inhibitors can be toxic, so we would like to find proper concentrations that will allow zebrafish to survive long enough to observe potential patterns in nerve concentration (via confocal microscopy) and tissue regeneration.

Emma Dunn '17

The Effects of Two Biotic Stressors on Carbon Allocation in Two Coniferous Trees

Brett Huggett, Biology, advisor

Invasive pathogens are currently responsible for high levels of tree mortality in the northeast United States. Eastern hemlock has been severely impacted by the hemlock woolly adelgid, while a fungal complex is causing high levels of needle damage in white pine trees. Little is known about how biotic stressors impact whole-tree carbon allocation. A carbon buffer of sugars and starches supports the metabolism of woody plants during times of stress when demand exceeds photosynthetic supply. The impact of pathogens on whole-tree distribution of sugar and starch was analyzed in both tree species to better understand plant response to stress.

Ian Erickson '18

"No More Pussy-Footin' around!": Sarah Palin and the Act of Going Rogue

Stephanie Kelley-Romano, Rhetoric, advisor

Sarah Palin's bizarre rhetoric in her 2016 endorsement speech of then-presidential candidate Donald Trump is a form of political *rogue-ness*, the act of subverting traditional standards of conduct to achieve some larger political goal. My research shows how Palin fuses a performance of hegemonic masculinity, frontier imagery, and anti-intellectualism to form her "rogue" persona.

Woods Fairchild '18

A Cross-cultural Analysis of Danish vs. American Higher Education Student Motivation

Georgia Nigro, Psychology, advisor

While studying in Copenhagen, Denmark, I conducted a

cross-cultural analysis of Danish vs. American college students' motivation. I conducted in-depth interviews with Danish students and with professors who have taught both Danish and American students, focusing specifically on how students demonstrate motivation in times of academic struggle or curriculum dissatisfaction. Through a hand-illustrated short animated video, I visually explicate how a cultural distinction between student perspectives suggests that these particular Danish students view their role as "guests" in their education system, while "Americans" see themselves as consumers, perhaps stemming from systematic differences between a welfare vs. capitalist system, respectively.

Evan Ferguson-Hull '17

Numerical Simulation of Constrained, Rigid Body Motion

Hong Lin, Physics, advisor

This thesis presents an overview of the techniques required to run accurate simulations of systems of constrained rigid bodies, as well as a summary of physical tests performed to assess the accuracy of these simulations. Included are recursive solutions to ordinary differential equations, constrained particle dynamics, Lagrangian dynamics, and rigid body simulation.

Laurel Fiddler '17

Creative Thesis Reading: Excerpts from a Short Novel

Jessica Anthony, English, advisor

I will be giving a reading of an excerpt from my creative thesis, which is a work of fiction. My novel is rooted in realism and is exploring the process of grief, specifically how it functions in everyday life and sparks unexpected human action.

Gregory Fitzgerald '17

Contemporary Understandings of Berlin: An Analysis of Spatial Constructions in The One

Raluca Cernahoschi, German, advisor

Last October, the Friedrichstadt-Palast in Berlin premiered *The One*, a revue featuring song, dance, acrobatics, and special effects. The show's constructions of physical and social spaces draw upon Berlin's unique cultural history. As a major tourist attraction, its portrayal of this history helps define contemporary understandings of the city and its past. My study analyzes the spatial constructions in *The One* with a concentration on how it represents cultural institutions associated with Berlin and how it mediates the perception of the city for an international audience.

Jake Flaherty '17

The Effect of Humility on the "Hubris Penalty"

Krista Aronson, Psychology, advisor

According to the "Hubris Penalty," although both are perceived as arrogant when they celebrate after a touchdown, Black football players are more likely to be penalized for celebrating than White football players (Hall & Livingston, 2011). Certain disarming mechanisms like humility have been shown to be effective in facilitating the success of Black leaders (Livingston & Pearce, 2009). This experiment tested whether a display of humility in the touchdown celebration was effective in overcoming the Hubris Penalty.

Creighton Foulkes '17 and Max Breschi '18

Collaboration of Ash Glazes Applied to Ceramic Pots
Susan Dewsnap, Art and Visual Culture, advisor

The shape and form of ceramic work is unique to each artist. Adding to the individuality of a piece is the application of glaze prior to the kiln firing. As ceramic artists at Bates, we have been lucky to work with, collaborate with, and learn from many other talented artists. This presentation exhibits a collaboration between Creighton Foulkes and Max Breschi, to showcase the creation of our pottery and the development of ash glazes. Wood ash glazes are made with simple ingredients, but allow for a highly variable surface on each pot. This installation showcases our work and lends insight into the ceramic process.

Danielle Fournier '18

Markets on the Move: A Comparative Study of Mobile Vending in Buenos Aires, Hanoi, and Cape Town

Michael Murray, Economics, advisor

Mobile vending is the act of selling goods in constant motion with the intention of interfacing with customers and evading regulation preventing sale of goods. In Buenos Aires, Hanoi, and Cape Town, mobile vendors have differing roles in the distribution of goods within the city. This comparative study seeks to understand mobile vending through analysis of type of goods sold, customer profile, and mechanism of sale. Research was gathered through observation and interview of active mobile vendors and customers participating in the informal economy. The lack of a single narrative across the observed cities demonstrates many factors drive the mobile vending industry.

Gabby Froehlich '17

Identifying Diversity of the Major Histocompatibility Complex I in Oceanodroma leucorhoa

Donald Dearborn, Biology, advisor

The goal of this thesis is to design a primer and develop a method to identify allelic diversity of the major histocompatibility complex (MHC) class I, a vital protein in the immune response in Leach's storm petrels. The amount of allelic diversity and where these polymorphisms lie is unknown in Leach's storm petrels, but well characterized in other, similar species. Using primers that have previously amplified exons 2-4 of MHCI in closely related bird species, a primer specific to Leach's storm petrel MHCI at exon 3 was designed. Polymorphic sites were identified and the number of alleles and minimum loci count was determined.

Sophie Gardephe '18 – see Ted Burns '19

Reading Women's Writing: England, Japan, and Latin America

Stephanie Pridgeon; Spanish, Joanna Sturiano, Japanese; and Myra Wright, English advisors

Sofia Gnabasiak '17 – see Hannah Chipman '17

Introversiion-Extraversiion and the Constitution of an Activist

Francesco Duina, Sociology, advisor

Alex Gogliettino '17

DNA Methylation: Targeting TET1 as a Treatment for Intellectual Disability

Andrew Kennedy, Chemistry, advisor

Pitt-Hopkins Syndrome (PTHS) is a rare Autism-spectrum disorder in which afflicted individuals are severely intellectually disabled and unable to form long-term memories. Long-term memory formation is thought to be mediated by epigenetic marks on the genome, such as DNA methylation. Here, we identified specific dysregulated gene expression and DNA methylation within the CA1 and dentate gyrus regions of the hippocampus in PTHS mice. Then, we determined if knocking out or knocking down an enzyme involved in DNA demethylation, TET1, can increase DNA methylation at plasticity-regulated genes in hippocampal tissue and enhance learning and memory in PTHS mice.

Lauren Goldman '17

The Effect of Psychological Distance on Reactions to Infidelity

Michael Sargent, Psychology, advisor

Studies suggest that when imagining being cheated on, men are more likely than women to predict greater distress over the sexual aspect, whereas the opposite is true for the emotional aspect. However, this difference was not present when participants recalled an actual instance of infidelity, suggesting that these reactions change as a function of decreasing psychological distance (hypotheticality to reality). This study examines whether varying a different element of psychological distance, namely temporal distance, would also have an effect on the tendencies of men and women to report greater distress in regard to the sexual or emotional aspects of infidelity.

Sophia Gottlieb '17 and Joshua Rines '17

Spatially Resolving Mass Distribution in Compact Galaxies

Aleksander Diamond-Stanic, Physics, advisor

Why are galaxies so bad at forming stars? Conflicts between observations and simulations of how efficiently galaxies can collapse cold, dense gas into stars differ an order of magnitude. Scientists turn to processes that inject energy or momentum into galaxies to prevent gas from cooling and forming stars. Our research investigates whether radiation pressure from stars could produce these jets of cold, dense gas and reduce galactic star formation. Understanding why galaxies struggle to form stars out of normal matter will inform our knowledge of the galactic lifecycle, and resolve the inefficiency dilemma between observations and simulations.

Julia Grace '17

Creative Thesis Reading: A Passage from Foreigner Found, a Novel

Jessica Anthony, English, advisor

I am presenting a passage from my fiction thesis. I have written a large amount of a novel called *Foreigner Found*, about a young American woman, Katherine Dryer, who studies art in Florence. Through her witty, bitter, and

autonomous narrative voice, Katherine is enticed by her eccentric Italian instructor and befriends a fellow American, who pulls her into untangling a mystery involving family, money, and violence. I have absolutely enjoyed working on this longer piece of fiction this year and thank my wonderful English and Creative Writing professors at Bates, especially Jessica Anthony, who have given me the confidence and happiness to do so.

Samantha Grant '18 – see Chris Crum '17
Off-Campus Study: Homestays while Abroad
David Das, Office of Off-Campus Study, advisor

Hannah Graves '17
Stress on College Campuses: Testing the Efficacy of Two Stress Resilience Techniques

Kaitlin White, Psychology, advisor
The focus of this study was concerned with the relationship between college student's stress and coping mechanisms. The assumption was that students self-reported stress measures would decrease after the use of the stress resilience techniques compared to the self-reported stress without the techniques. This study focuses on college students, of all years, who were randomly assigned to one of two stress resilience techniques: an online psychology skill taken from the MeQuilibrium program or a deep breathing exercise. Results from this study would provide us with optimistic solutions for students experiencing stress on college campuses.

Evan Hansen-Bundy '17
Creative Thesis Reading: Fiction
Jessica Anthony, English, advisor
I will present a reading from my creative thesis in fiction.

Marisol Hernandez '19 – see Matthew Bodwell '18
The Comparative Politics of Climate Change
James Richter, Politics, advisor

Samuel Hersh '18, Becca Howard '19, and Claire Sickinger '19
Exploring Dance History: Important Figures and Their Impact

Rachel Boggia, Dance, advisor
In fall 2016, students in Dance 250, Early Modern Dance History, conducted research on formative artists of the twentieth-century modern dance movement. Our presentations will discuss the innovations of George Balanchine, Bill T. Jones, and Anna Sokolow and their impact on the landscape of dance and of society.

Sarah Holmes '17
Analyzing the Development of the Mouse Accessory Olfactory Bulb Using Select Plane Illumination Microscopy

Jason Castro, Neuroscience, advisor
The accessory olfactory bulb (AOB) is part of the vomeronasal system which detects nonvolatile odors such as pheromones. Although this structure is essential for coordinating innate behaviors in early life, we understand surprisingly little about its early development. To study the development of the mouse AOB, including circuit refinement, bulb size, and density of mitral cells, bulbs of

different ages were imaged by optically clearing the tissue and using selective plane illumination microscopy. This method allows for the imaging of large pieces of tissue with minimal photodamage and the 3D reconstruction of the entire bulb at the cellular level.

Tessa Holtzman '17
Mi Bolivia está Cambiando: The Effect of Decentralization on Ethno-political Mobilization in Bolivia

Jacob Longaker, Politics, advisor
In 1994 Bolivia passed one of the most comprehensive political decentralization reforms in Latin America. It broke down a monolithic government into 314 semi-autonomous municipalities. In the wake of this change, indigenous populations increased their political engagement. Did the 1994 decentralization reform effect ethno-political mobilization in Bolivia? My research explores the effects of decentralization reform on ethno-political mobilization at the local level. I argue that, at the local level, variables like GDP per capita, numbers of self-identifying ethnic individuals, and highland vs. lowland divides impact whether decentralization reforms do (or do not) mobilize ethnicity in a given district.

Riley Hopkins '18
Let's Move It: Body Image
Susan Langdon, Psychology, advisor

This study explored the relationship between body image and physical activity taking into consideration identity as a dancer and/or athlete. Specifically, it tested the effects of type of physical activity in dance, athletics, and exercise at Bates on body perceptions. Using identical surveys at the beginning and end of fall 2016 semester, data illustrated how physical activity can impact body image while also measuring participant identity as dancer, athlete, exerciser, or dancer-athlete. There were significant relationships between identity, physical activity, and body image and significant changes in these variables from the beginning to the end of the semester.

Tremearne Hotz '17
Utilization of DNA Methylation to Treat Memory Deficits
Andrew Kennedy, Chemistry, advisor

In recent years DNA methylation has been identified as an integral regulator of memory formation and consolidation. In our research, we describe how inhibiting a critical member of the DNA methylation pathway, TET enzymes, works to enhance memory. Furthermore, we utilized this phenomenon in syndromes associated with memory deficits, describing how well inhibiting TET enzymes works to ameliorate memory impairment. This was done via genetic knockdowns and knockouts of TET enzymes in mice, who were subsequently subject to memory-gauging paradigms. Our preliminary results show promise in using methylation-based therapies to treat memory deficits.

Becca Howard '19 – see Samuel Hersh '18
Exploring Dance History: Important Figures and Their Impact
Rachel Boggia, Dance, advisor

Tara Humphries '17 – see Hannah Chipman '17
Community Perspectives on Childhood Adversity, Trauma, and Family Dysfunction
Emily Kane, Sociology, advisor

Samra Husremovic '18
Highly Selective Ru/TiO₂ Catalysts for HDO of Phenolic Compound: Effects of Support Structure and Partial Substitution of Nickel for Ruthenium

Ryan Nelson, Chemistry, advisor
Bio-oils containing oxygenated phenol-like compounds need to undergo catalytic upgrading via reductive deoxygenation to form high energy density transportation fuels. Previous research from our group identified Ru/TiO₂ as an effective catalyst for hydrodeoxygenation (HDO) of phenol to benzene. A combination of experimental and computational approaches suggested that the remarkable direct-deoxygenation selectivity of Ru/TiO₂ was due to the amphoteric properties of TiO₂. This facilitated both the heterolytic cleavage of H₂ and protonation of the substrate, which weakened the C-O bond. In this work, we explored the catalytic activity of bimetallic Ru_xNi_{1-x}/TiO₂ catalysts and the importance of rutile-rutile interactions between the TiO₂ support and the RuO₂ precursor. Ru/TiO₂ catalysts with rutile only and mixed rutile/anatase TiO₂ supports showed high HDO activity, while pure anatase support catalysts demonstrated negligible activity. Nickel was incorporated into Ru/TiO₂ catalyst to reduce the amount of Ru and make the catalysts more economically and environmentally efficient. A bimetallic catalyst containing a 1:1 ratio of Ru to Ni was found to be an effective catalyst, yielding over 90% deoxygenated products in HDO reactions with phenol. Although highly effective in deoxygenation, the bimetallic catalysts showed less selectivity for the direct deoxygenation product benzene.

Robert Ibarra '17
How Does Socioeconomic Status Affect Student Developmental Outcomes in Restorative Circles?

Georgia Nigro, Psychology, advisor
In research, students of color have reported learning less on specific developmental outcomes compared to white students in various disciplinary processes including the one explored in this study, restorative practices (Karp & Frank, 2016). Would similar findings hold for socioeconomic status (SES) in an experimental paradigm? In a 2 (participant background: Low SES vs High SES) x 2 (offender background: Low SES vs High SES) experiment, participants are asked to read a transcript of a victim-offender restorative circle. They take the perspective of the offender and fill out a modified version of the Six Scales of Student Development used in Karp and Sacks (2014) to measure developmental goals. I hope to discover if socioeconomic status affects how much students learn from restorative circles.

Maddie Inlow '17
The Impact of Socioeconomic Status on Concussion Awareness of Maine High School Students

Karen Palin, Biology, advisor
This study aimed to identify the level of concussion awareness among high school students from two different socioeconomic communities in Maine, Portland and

Falmouth. The Concussion Awareness Survey was administered online to students with items categorized into four indexes regarding concussion knowledge, causes, symptoms and treatments. The data showed that there are some areas of concussion awareness that need to be addressed in both school districts. However, overall there were no significant differences in concussion awareness between students at the two schools.

Noah Jallo-Prufer '17
Advocating for an Ecofeminist Environmental Ethic: An Analysis of Val Plumwood's Environmental Culture and Margaret Atwood's Oryx and Crake, and an Endorsement of Their Shared Philosophy

Susan Stark, Philosophy, advisor
This thesis discusses, and endorses, the environmental ethic proposed by Australian philosopher Val Plumwood in her book *Environmental Culture* via a critical analysis of Margaret Atwood's *Oryx and Crake*. Atwood's novel functions as a kind of modern Socratic dialogue: Atwood's main characters acting as mouthpieces for various competing eco-ethical ideologies, including utilitarianism, deep ecology, and ecofeminism. The philosophical claims made by Atwood in *Oryx and Crake* are analyzed in the larger context of eco-ethical discourse, a conversation which began in the mid-twentieth century, and continues today.

Sadie James '17
The Effects of Gender and Sexuality in the Classification of Stalking

Susan Langdon, Psychology, advisor
According to the Centers for Disease Control and Prevention, approximately 15% of women and 6% of men have been stalked in their lifetime. Through the manipulation of gender and sexuality in stalking scenario, this thesis aims to understand student's understanding and perceptions of stalking. Specifically, the thesis seeks to understand what students consider to be serious enough to report through the manipulation of the target's characteristics of gender and sexuality. Finally, this thesis aims to shed light on how perceptions of gender roles are influenced by manipulations in characteristics of the target in stalking scenarios.

Emma Jarczyk '17
The Pursuit of Epigenetic Changes to Improve Long-Term Memory and Learning in Pitt-Hopkins Syndrome

Andrew Kennedy, Chemistry, advisor
The main focus of this project is to synthesize cytosine derivatives with various substituents that could be used to inhibit TET enzymes and improve memory and cognition in individuals with Pitt-Hopkins Syndrome (PHS). We began by making a cytosine derivative that had been synthesized by previous researchers, while the other compounds we created were novel. These derivatives were created through a Chan-Lam coupling reaction using copper acetate, TMEDA, and MeOH/H₂O in solution. In the future, these organic molecules will be tested in vitro to understand how they interact with TET enzymes and how they might be used to alter epigenetic mechanisms that effect learning and memory.

Aashu Jha '17 and Niccolò Bigagli '17
Nonlinear Dynamics of Vertical-Cavity Surface-Emitting Lasers (VCSELs) Subject to Optical Injection and Feedback

Hong Lin, Physics, advisor

This study investigates nonlinear dynamics in a vertical-cavity surface-emitting laser subject to optical injection and feedback. The objective of our work is to identify the perturbation conditions at which different instabilities occur. Nonlinear dynamics were observed under different optical injection schemes: single and dual beam optical injection in both parallel and orthogonal polarization directions were introduced into single and dual mode operation regime of the VCSEL. Dynamics maps in parameter space of injection power and frequency detuning are plotted for each scheme. The study also thoroughly explores dynamical features triggered in response to a combination of injection and feedback.

Robert Jones '17
*Western Blot Analysis and Expression Vector Design for *Borrelia burgdorferi* Ribonucleases*

Paula Schlax, Chemistry, advisor

Lyme disease is the most reported vector-borne disease in the United States, for which the spirochete *Borrelia burgdorferi* is the causative agent responsible. Differential protein expression of virulence factors is required for *B. burgdorferi* to survive and maintain pathogenicity throughout its enzootic cycle. Protein expression levels can be controlled through mRNA degradation by ribonucleases. This study tested the efficacy of antibodies designed for *B. burgdorferi* ribonucleases RNase III, RNase Y, and PNPase in Western blot analysis. In addition, expression vectors for YbeY and Oligoribonuclease were designed, with future work being directed towards sequencing and characterizing these two ribonucleases.

Grace Jurkovich '18 – see Chris Crum '17
Off-Campus Study: Homestays while Abroad
David Das, Office of Off-Campus Study, advisor

Amy Katz '17 – see Chris Crum '17
Off-Campus Study: Homestays while Abroad
David Das, Office of Off-Campus Study, advisor

Emma Katz '17
*The Effect of the Dispersion of Non-rewarding Flowers on Pollination by Bumblebees (*Bombus impatiens*): A Lab Study*

Carla Essenberg, Biology, advisor

Most flowering plant species in nature rely on insect pollination to reproduce, and most of these plants offer nectar rewards to pollinators to encourage them to return. Interestingly, some groups of flowering plants, like orchids, do not offer any rewards, and it is interesting how these non-rewarding plants are able to attract pollinators and compete with other, rewarding plants for pollinator visits. In this study, the goal was to see how the non-rewarding plants should grow with respect to a rewarding species to receive the best visits from pollinators. I tested this using bumblebees with two flower types—blue (rewarding) and purple (non-rewarding)—arranged in one of two ways—mixed together or grouped into clumps by species. I

collected data on the number of visits to each color, switches between colors, and consecutive visits to the same color. I found that the intermixed arrangement caused more visits to the non-rewarding flowers, but also caused more switching between flower types, which is bad for both plant species.

Fahim Sakil Khan '20
Galaxy Spectroscopy in 3D

Aleksander Diamond-Stanic, Physics, advisor

This research project is broadly related to questions of why galaxies are so inefficient at converting gas into stars. Our goal is to understand the geometry, kinematics, and multi-phase structure of gas in the interstellar medium within galaxies and gas in circumgalactic medium around galaxies. For this project, we focused on using optical emission lines and the unique dataset of spatially resolved spectroscopy from MaNGA (Mapping Nearby Galaxies at Apache Point Observatory), and we have developed techniques to identify galaxies with extra-planar gas on the basis of optical emission lines that extend above and below the plane of disk galaxies.

Anna Kingston '17
A Process Evaluation of The Picture Book Project
Krista Aronson, Psychology, advisor

More than one third of libraries do not achieve adequate representations of diversity within their picture book collections (Williams & Deyoe, 2014). One obstacle is identification: no comprehensive source or systematic methodology for pinpointing titles featuring people of color currently exists. Professor Krista Aronson and her team are working to ameliorate this through the creation of a lexicon of terms that can be used to identify diverse children's books, which will result in the creation of a comprehensive, online, searchable tool to make it easier for librarians, parents, and teachers to identify diverse picture book titles. This work is connected with The Picture Book Project, a collection of approximately 2,000 fiction and narrative non-fiction picture books for grades K-3 published between 2002 and 2015 featuring human characters of color. Housed at Bates College, this represents the only circulating collection of its kind. The current study is a process evaluation and analysis of their progress to date.

Zachary Kinsella '17
Creative Thesis Reading: Poetry
Eden Osucha, English, advisor

The poem I will be reading explores the complexities of kinship as I have come to understand and recognize them.

Peder Knoth '17
Faces, Emotions, and Blurry Words
Todd Kahan, Psychology, advisor

Prior research has found that blurred words (e.g., word) are perceived as clearer than equally blurred nonsense letter strings (e.g., rdow). This experiment tested participants ability to match the level of clarity of two emotionally laden blurred words. The overall purpose of this experiment was to see how emotional expressions and stereotypes affect visual perception and the clarity of words.

William Koller '17

Alexithymia and Emotion Regulation in Depression and Anxiety

Sara Masland, Psychology, advisor

Major depressive and generalized anxiety disorder are associated with emotion dysregulation. Alexithymia, or an inability to identify emotions, is a common feature of these disorders, and is associated with difficulties implementing adaptive emotion regulation (ER) techniques. In this study, alexithymia is examined as a mediator of the relationship between depressive/anxious symptoms and ER difficulty. Study 1 explores this relationship by focusing on implicit ER, while Study 2 focuses on explicit ER. The predicted findings include a tendency for individuals with depressive/anxious symptomatology to display worse ER ability. These deficits are expected to be greater among individuals higher in alexithymia.

Colin Kraft '17

Petrology of the Hastingsite-Riebeckite Granite of Mt. Cabot, NH

Geneviève Robert, Geology, advisor

We analyzed samples of the hastingsite-riebeckite granitoid pluton of Mt. Cabot, NH, for their mineralogy, textures, and geochemistry. Discrete zones of hastingsite and riebeckite suggest varying oxygen fugacity conditions across the magma body during crystallization or that distinct Na-rich or Ca-rich magmas make up the pluton. Modal analysis shows two different rock types within the pluton, syeno granites and quartz syenites. Exsolved alkali feldspar indicate crystallization at low pressure. Intergranular albite and albite rims on alkali feldspars indicate late stage albitization and replacement and unmixing of alkali feldspar. Sericitization of alkali feldspar and biotitization of amphiboles suggest post magmatic hydrothermal alteration.

Claudia Krasnow '18 – see Ted Burns'19

Reading Women's Writing: England, Japan, and Latin America

Stephanie Pridgeon, Spanish; Joanna Sturiano, Japanese; and Myra Wright, English advisors

Andrew Lachance '17

Persistence of Hyperoxia-induced "Maturation" of the Hypoxic Ventilatory Response (HVR)

Ryan Bavis, Biology, advisor

The body's acute response to low oxygen, the hypoxic ventilatory response (HVR), matures postnatally from a biphasic to a sustained breathing pattern. Using the rat model, it has been demonstrated that raising neonatal pups in high oxygen concentrations can elicit a sustained response earlier in development. To determine if the maturation of the HVR is truly accelerated, we exposed rats to high oxygen for three days postnatally, followed by three days of normal oxygen, and then re-measured breathing. While hyperoxia rats at day three showed accelerated maturation of the HVR, the HVR was not different for hyperoxia rats at day six compared with age matched controls, indicating phenotypic reversibility.

Halie Lange '17 – see Claire Brown '17

Knowledge and the Public Good: Exploring Intersections of Theory and Practice

Darby Ray, Harvard Center for Community Partnerships, advisor

Rosemary Leahey '17

The Role of Airborne Microbes in the Bates College Museum of Art

Lee Abrahamsen, Biology, advisor

Airborne microbes have been implicated in the deterioration of works of art in museums. In this thesis, the presence of fungi and bacteria in the air at the Bates College Museum of Art was investigated to establish a baseline in determining the roles the microbes play in the possible deterioration of artwork. By taking samples of air at different locations around the museum, this research yields information about what fungi and bacteria are present in the museum environment. Additionally, the research may be useful to the Museum of Art in determining the efficiency of their HVAC system.

Noah Levick '17

Creative Thesis Reading: "What We Talk about When We Talk about Sports"

Elizabeth Rush Mueller, English, advisor

I will read excerpts from my creative nonfiction thesis, titled "What We Talk about When We Talk about Sports."

Meghan Lynch '17 – see Hannah Chipman '17

From Milking to Maintaining: Best Practices for Housing Code Enforcement in Lewiston

Emily Kane, Sociology, advisor

Ryan Mahar '17

Maze Navigation and Learning in Juvenile Leach's Storm Petrels

Donald Dearborn, Biology, advisor

We measured the capacity of storm petrels to learn through navigational tasks, as well as the effect of nutrition in task completion and memory. Juvenile Leach's storm were designated into three separate feeding treatments: supplemented, restricted, and control. Petrels were then placed in three maze types of increasing difficulty. Succession of each bird from one maze to the next depended on their completion of the subsequent maze in under 10 minutes. The time that it took the birds to complete each maze was measured, as well as any peripheral behavioral observations. Maze completion was found to be independent of nutritional treatment, suggesting that energy is allocated selectively in juvenile birds to compensate for cognitive deficiency due to decreased food availability. Overall, birds displayed signs of learning through increased maze completion time and directional preference.

Julia Mason '17

Creative Thesis Reading: Fiction

Jessica Anthony, English, advisor

I will be reading a section of a larger piece from my creative thesis in prose. The full piece is a short novel that explores ideas in gender, identity, and self-discovery.

Shelbie McCormack '19 – see Zofia Ahmad '19
Presenting the World: Geographical Narratives from the Ancient World
Hamish Cameron, Classical and Medieval Studies, advisor

Madeline McLean '17
Role of Nfe2 and Oxidative Stress on Zebrafish Inner Ear Development

Larissa Williams, Biology, advisor
Nuclear factor-erythroid 2 (Nfe2) is a transcription factor that is induced by oxidative stress. It is localized to the inner ear of zebrafish and its loss results in deformation of biomineralized ear structures called otoliths and sensory cells known as neuromasts. Acute pro-oxidant exposure was used to assess the role of nfe2 in oxidative stress and ear development. Treated wildtype animals had statistically significant deformation of neuromast cells at 48hpf as compared to untreated controls while less significant deformation was seen at 72 and 96hpf. Morpholino knockdown for Nfe2 will be used to assess its role in the pro-oxidant response.

Liam McLoughlin '19 and Matthew Ameduri '19
An Invisible Predicament: Wabanaki Healthcare
Joseph Hall, History, advisor

Health disparities have plagued Native Americans since European arrival. Today, the cumulative results of displacement and assimilation have led to extreme healthcare inequality among native populations in our backyard. With a focus on the Wabanaki Nation of Maine, this project considers three approaches to mending health disparities: increased federal funding of Indian Health Service, a better sense of historical trauma, and increased support for traditional healing practices.

Katherine McNally '17
Island Identities in Disjuncture: Local Forms of Sociopolitical Critique in the Shetland Islands

Loring Danforth, Anthropology, advisor
Island communities are experiencing a rapid depopulation of rural areas. In both the Maldives and the Shetland Islands, local identities rooted to the land are being challenged by the economic policies of these states. As a result, communities are being physically and culturally uprooted by economic necessity. Kate McNally and Anu Ahmed discuss the ways in which people from Shetland and the Maldives use nostalgia as a form of sociopolitical critique. They draw on research done for their respective anthropology honors theses about the Shetland Islands and the Maldives.

Kevin Melvin '17
Homeless Youth's Perspectives on Barriers to Education
Georgia Nigro, Psychology, advisor
Homeless youth are often an elusive population to study; as a result, their voices go underrepresented. The purpose of this study was to investigate homeless youth's perspectives on academics within the three programs of the New Beginnings organization: the transitional living program, the twenty-one-day emergency shelter, and the drop-in center. To carry out this investigation, photovoice was used as a means of generating discussion that was centered

around the factors that facilitate and obstruct education within the New Beginnings facilities. Participating youth took photographs in response to prompts about learning and education. Common themes were extracted through a thematic analysis of the discussions of the photographs.

Ankrish Milne '17
AKT Modulates Cardiac Regeneration in Zebrafish
Nancy Kleckner, Biology, advisor

Cardiac disease is one of the leading causes of death around the world. After sustaining damage to the heart, human heart muscle cells (cardiomyocytes) are unable to regenerate. Zebrafish provide a model species in which to study cardiac regeneration, as up to 60% of chemically ablated cardiomyocytes have been shown to regenerate within one month of ablation (Wang et al. 2011). AKT, a serine-threonine kinase, plays a role in proliferation, hypertrophy, and dedifferentiation during cardiac regeneration. This study aims to investigate the role of AKT in the regeneration of zebrafish cardiomyocytes.

Alec Montes de Oca '17
Manipulation of Defendant Race and Race Salience and Its Effects on Ratings of Guilt

Amy Douglass, Psychology, advisor
The present study examines how race salience affects jurors' perceptions of a defendant's guilt. In prior research, Black and White defendants are evaluated as equally guilty when race is made salient (e.g., if the crime is racially charged). However, if race is not salient, White jurors rate Black defendants as guiltier than White defendants (Sommers & Ellsworth, 2000). The current research will test a new operationalization of race salience: the defendants' activities. In the race salient condition, the Black defendant participates in the Black Lives Matter Movement and the White defendant participates in the Fellowship of Christian Athletes Club. In the non-race salient condition, the Black defendant participates in student government and the White defendant participates in college athletics. The experimenter predicts to find the same results as Sommers and Ellsworth where White mock jurors rate Black defendants as guiltier than White defendants in the non-race salient condition and the racial biases disappear in the race salient condition.

Kate Moody '17
Developmental Trajectory of Oxytocin-dependent Changes in Psychosocial Adjustment across Adulthood
Nancy Koven, Neuroscience, advisor

Oxytocin (OT) is known to influence neurocognitive functioning, particularly the processing of social and emotional stimuli. However, we do not have a clear understanding of the relationship between endogenous OT levels and specific facets of psychosocial health in the general population. This study utilizes peripheral biomarker assay, neuropsychological assessment, and behavioral testing in a healthy community sample of men and women ages 20-80. Analysis will focus on the extent to which basal OT levels predict social sensitivity and emotional receptivity, two social cognitive mechanisms, and the relevance of these variables as statistical mediators of psychosocial functioning across adulthood.

Andrew Moreau '17

Healing Trauma: A Guide to Social Recovery for Substance Abuse

Jason Castro, Neuroscience, advisor

Grace Street Services (GSS) is a local recovery clinic focused on social rehabilitation for substance abuse. Very often, persons become addicted not out of desire for the drug, but due to the reality of their circumstances. GSS recognizes the trauma that these patients have been through. Through a 4-stage intensive outpatient program, patients can finally see the vision they have for themselves and write their own story, and this underlying trauma can start to heal. Under the guidance of Marty O'Brien, the founder, and Tim Cheney, the chief operations officer, GSS was ranked in the top 3% of substance abuse recovery centers in the State of Maine.

Zoe Moss '17

Real vs. Believed Empowerment: Moving beyond the Individual Economic Empowerment of Neo-Liberalism

Nina Hagel, Politics, advisor

Since the late twentieth-century adaptation of neo-liberal economic and political policies, the conception of what empowerment means has become more individualized and economic based. In this new political climate of rising unrest, many are questioning what a truly empowered citizen looks like. Using the works of Sara Rushing, Wendy Brown, and Sheldon Wolin, I argue that the neo-liberal conception of empowerment can actually function to disempower citizens. I advocate for a return to a politically collective framing of empowerment in order to ensure that real empowerment is experienced by as many people as possible.

Reed Mszar '18

Familial Hypercholesterolemia (FH): A Registry-based Analysis of Local FH Trends

Karen Palin, Biology, advisor

There are an estimated 14 to 34 million individuals living with Familial Hypercholesterolemia (FH) worldwide. FH is a genetic disorder characterized by increased cholesterol levels, specifically low-density lipoprotein cholesterol (LDL). With over 90% of the FH population remaining undiagnosed, registry-based screening of individuals suspected of FH has served as an essential measure to prevent early cardiac events and premature death. The project is intended to provide a comprehensive review of the disproportionately high prevalence of FH among individuals in the greater Lewiston-Auburn area compared to national and state proportions through utilizing the CASCADE FH™ Registry.

Will Murray '20 and Chase Winham '20

A War on Social Networks

Denis Sweet, Extradisciplinary Studies, advisor

The twenty-first century is an age of digital unity. Due to the advent of social networks, communication is now widely accessible, remarkably simple, and startling ubiquitous. Though this extreme interconnectivity might enable us in some ways, it also opens the door to manipulation. Terrorist organizations like ISIS thrive on

our hyperconnectivity; they have harnessed the power of the internet, turning the World Wide Web into a battle ground for digital propaganda, systematic recruitment, and strategic manipulation. Despite the organization's Middle Eastern and North African origins, ISIS has used social networks as stepping stones to transcend geographic boundaries and forge a terrorist organization of the technological age. Consequentially, ISIS has shaped the internet into perhaps the most lethal military strategy of contemporary warfare.

Koya Nakata '17

Barack Obama and the Maternal Style: Rhetorical Response to Mass Shooting Epidemics

Stephanie Kelley-Romano, Rhetoric, advisor

In his 5 January 2016 speech on gun control, former President Barack Obama uses crisis rhetoric with a maternal approach to garner support for gun control reform. Responding to a string of mass shootings characterized by the media as an "epidemic" — the most notorious being the 2013 Sandy Hook shootings — Obama adopts a stylistically feminine persona to address the dominant cultural narrative of children being targeted in mass shootings as well as the burden and limitations of being the first Black male President.

Evan Nece '17

Prevalence, Risk Factors, and Resistance Mechanisms of Staphylococcus aureus and Methicillin-Resistant Staphylococcus aureus in the Student Population of Bates College

Lee Abrahamsen, Biology, advisor

Staphylococcus aureus is a pathogenic bacterium that can colonize humans asymptotically and become a member of an individual's normal bacterial flora. Of note is the trend for *S. aureus* to become resistant to methicillin, a synthetic derivative of penicillin commonly used as a first-line drug to treat *S. aureus* infections. This study has several objectives: to observe and determine the prevalence of MSSA and MRSA colonization in the student population at Bates College, to identify the existing and emerging risk factors linked to the colonization and carriage of MRSA and MSSA, to examine patterns of antibiotic resistance among isolated *S. aureus* samples taken from the studied population, and to compare this data to data collected in previous years at Bates to determine trends in the colonization and carriage rates of MSSA and MRSA over time.

Julia Nemy '18

An Overview of Agriculture Production and Processes in Diègo-Suarez, Diana Region of Madagascar

Tina Mangieri, Office of Off-Campus Study, advisor

I focused my independent study on agricultural production in the north of the Madagascar and the different methods and processes involved. I researched seven distinct agricultural sectors ranging from traditional substance rice farming to a large scale foreign-owned tuna canning factory which exports all products internationally. Agriculture is the basic livelihood of 80% of Malagasies. The variety of production methods represent the conflict between

traditional practices that require immense physical labor but give little monetary gain, vs. participating in foreign owned modern industries that exploit the natural environment, present undesirable working conditions, but give a more substantial monetary salary.

John Neufeld '17

Caffeine and Color Memory Recall in Free-flying Bumblebees

Carla Essenberg, Biology, advisor

My study investigated how caffeine effects the learning and memory of free-flying bumblebees. The bees were trained to associate a color with a reward and then were required to recall that memory 30 minutes later. Half of the bees foraged for caffeine and sucrose solution and the other half of the bees only foraged for sucrose. The number of correct visits was then compared to to see if caffeine had any effect on learning and memory.

Max Nguyen '17

The Role of Transcription Factor Nfe2 in Zebrafish Development

Larissa Williams, Biology, advisor

Development is a rigorous process that involves the delicate coordination and balance of various molecular processes. The dynamic of these procedures is maintained by regulatory proteins, whereby they either induce, repress or activate genetic networks associated with each stage of development. Nfe2, a member of the bZIP-CnC family of transcription factors, plays an important role during zebrafish development. Previous loss of function studies have implicated Nfe2 in the regulation of hematopoiesis, otic vesicle formation and swim bladder inflation. Using bioinformatic and molecular tools, this research seeks to understand the involvement of Nfe2 in the process of zebrafish development.

Gabriel Nott '17

Not a Laughing Matter: Last Week Tonight with John Oliver, the Performance of Public Intellect, and Burke's Frames

Stephanie Kelley-Romano, Rhetoric, advisor

This presentation examines John Oliver's coverage of the political rise of Donald Trump throughout the third season of his show, *Last Week Tonight*. Oliver's performance as host of the show is based on satire, contextual clash, and ironic rationality, and indicates a simultaneously comic and burlesque view of Trump's candidacy. In simultaneously reporting on Trump's candidacy as a problem that can be solved through discourse while also reducing Trump through comments about his appearance and demeanor, Oliver's criticism constitutes a new development in the comedy news genre.

Amar Ojha '17

Virtuous Particularism: The Case for Contextual Value and Moral Sensitivity

Susan Stark, Philosophy, advisor

We cite moral principles as justifications for our actions, but they are often overridden by other considerations or fail to count as a reason to act at all. Principlists assign a permanent moral value that is invariable across situations. Particularists, in contrast, consider reasons holistically and

allow fluctuations in value as contextual dependents. To consider contextual particulars is to have situations impress requirements upon the individual, which necessitates reception and attention to relevant particulars in contexts. Such cultivation of character requires that we consider morality not as the ability to will the good, but as a sensitivity to the good.

Gabriella O'Leary '17 – see Hannah Chipman '17
Perceptions of Muslim Women: The Origin and Variation of Stereotypes among Students at Bates College
Francesco Duina, Sociology, advisor

Nick Orlando '17

Diverse Picture Books in an All-White World

Krista Aronson, Psychology, advisor

Research indicates that children of color have been, and continue to be, largely absent from children's literature (Larrick, 1965; Chall et al., 1979). Librarians in charge of collection development are faced with the daunting task of providing a sufficient amount of quality literature featuring people of color. Previous research by The Bates Picture Book Project has identified the top twenty libraries in the country and conducted interviews with their collections librarians to identify their most effective practices. As a continuation of this project, the current study aims to better understand the number and nature of children's books on their shelves to provide further guidance for librarians looking to construct inclusive collections.

Sadie Mae Palmatier '18

Tourism and the Environment in Bhutan: Current Perceptions of and Suggested Improvements to Tourism-Related Infrastructure

Tina Mangieri, Office of Off-Campus Study, advisor

The tourism industry in Bhutan has been steadily increasing since its privatization in 1991. This increase has been observed in spite of the country's high daily tariff of \$250 USD per person for international tourists. Most tourists come to the country in order to witness a well-preserved environment and culture. The existence of which has been ensured by the country's motto of "high value, low impact" tourism. This research investigated the validity of this claim through the eyes of international and regional tourists, tour guides, and businesses associated with the tourism industry. In order to do so, I conducted semi-structured interviews over an eleven-day period in Bumthang Bhutan. The research concentrated on the physical nature of the tourism industry through perceptions of infrastructure and suggestions for future implementations. Categories of tourist activities and the quality of the infrastructure they experienced during their travels were measured. Recorded observations of environmentally damaging aspects of the industry resulted in the acknowledgment of garbage litter as a major environmental problem within the country. However, a single cause of this issue was not concluded. This research resulted in several suggested improvements to forms of infrastructure including the East to West highway, availability of public toilets across the country, and basic amenities within hotels. The research also found that the seasonality of visitors within the country affects the behavior of businesses associated with the industry. Given

these results, there is a need for greater monitoring efforts by the tourism council and the Royal Government of Bhutan in order to evaluate the effects of tourism on Bhutan's environment and its people in the long term.

Jacob Pantazis '17

Roles of Nfe2-Related CNC bZIP Factors in Response to Oxidative Stress as Induced by Mono (2-ethylhexyl) Phthalate

Larissa Williams, Biology, advisor

Phthalates are a class of plasticizers that were used ubiquitously in commercial food packaging prior to EPA scheduling "probable human carcinogens." Mono (2-ethylhexyl) phthalate (MEHP) and other chemicals of this group are known to induce oxidative stress, acting as peroxisome proliferators. The stress induced by phthalates has been shown to be mediated by the action of a class of Nfe2-related transcription factors which are part of the CNC bZIP family. Presented is a study of the morphological deficiencies experienced by CNC bZIP factor-deficient *Danio rerio* subjects exposed to MEHP in an attempt to further understand the significance of these proteins.

Sidney Parham '17

Evaluating Effective Altruism: Methods and Demandingness

Paul Schofield, Philosophy, advisor

What should we do with our lives? Effective altruists have an answer: We ought to do as much good as we can. This might seem straightforward, but it leads to startling conclusions and questions. How can we do the most good? Should we focus directly on an issue of moral concern, or can we accomplish more by earning money and donating to an effective charity? What does it mean to do the most good? Most important, if doing as much good as we can means giving up what makes life meaningful, should we really seek that as a goal?

Matthew Parrino '19

Solving Sparse Eigensystems with Fluid Dynamic Applications

Jeffrey Oishi, Physics, advisor

Problems often arise in fluid dynamic systems involving partial differential equations of high order. Such problems typically have no analytical solution and must be solved computationally. Since a partial derivative may be interpreted as an operator, the natural computational analogue is an operator matrix, reducing the system to an eigenvalue problem. This project explores such problems, particularly in the instance when operator matrices are sparse; in other words, most of their elements are zero. In this case, highly optimized solvers may be used to dramatically decrease compute time.

Maggie Paulich '17

The Effect of Race on the Meaning of Positive Stereotypes of African Americans

Michael Sargent, Psychology, advisor

The current study attempts to understand how positive

stereotypes are ostensibly positive, but potentially negative by investigating whether certain associations can actually change the meaning of the stereotypic word. The study uses a priming task to see if positive stereotypes of African American males will change in meaning depending on whether they are applied to Black targets or White targets. This research could give further insight into the effects of positive stereotypes.

Kelsey Pearson '17

The Hero's Journey and Soul Retrieval Therapy

Cynthia Baker, Religious Studies, advisor

This project explores the therapeutic benefits of Neo-Shamanism practices derived from paradigms and theories developed in comparative religion. I begin by investigating Joseph Campbell's archetype of the hero's journey and examine how Sandra Ingerman's Soul Retrieval Therapy integrates Campbell's insights into practice. Understanding connections among religion, myth, and psychology could contribute to the health and well being of humankind and allow more clinicians to incorporate similar models into their own practice. The project also includes a first-person exploration of Soul Retrieval Therapy.

Randy Peralta '18

What's on Your Bookshelf? Availability and Demographics of Multicultural Literature in the United States

Krista Aronson, Psychology, advisor

The availability of multicultural children's literature has received increasing attention among librarians, educators, parents, and scholars (see #WeNeedDiverse Books). The current research project contributes to this movement by exploring which books and in what quantities they are available to children in public libraries around the country. Using the WorldCat, IMLS and U.S. Census databases, this project maps the distribution of diverse picture book in public libraries across the country; identifying which states and libraries are high performers. This project is an extension and application of The Picture Book Project, A Bates College collection portraying people of color, the only circulating collection of its kind.

Emmett Peterson '17

Lyme Disease: Gene Regulation of Bpur and FlaB in Borrelia burgdorferi

Paula Schlax, Chemistry, advisor

Borrelia burgdorferi is a bacterial spirochete that causes Lyme disease. The spirochete is particularly infectious due to its ability to regulate proteins as it undergoes significant protein profile changes throughout its dynamic lifecycle between vector ticks and vertebrate hosts. This study investigates the mechanisms of protein regulation in *B. burgdorferi* through the cleavage rates of stem loops by RNase III as well as the posttranscriptional regulation of the BpuR and FlaB proteins. RNase III orthologs cleave substrates to optimize RNA function and decay rates thereby controlling RNA stability and translation efficiency. FlaB is a protein related to flagellar motility and Bpur is a self-regulated transcriptional regulatory protein.

Celine Pichette '17

The Effects of Forestry Management on Network Metrics of Bee Pollinators

Carla Essenberg, Biology, advisor

Bees are a critical pollinator whose impact is keenly felt in agricultural communities. The decline of bee populations has accelerated in recent years, severely affecting crop yields and therefore food production. Conservation efforts have focused on maintaining and promoting agricultural pollination due to its economic benefits, yet horticulture only focuses on a certain type of land management. My project focuses on bee pollinator networks in forested areas. I focused on three land management types: old growth, clear cut, and strip cut. I collected my data on Kenauk Nature property location in between Montreal and Ottawa.

Laura Pietropaoli '17 and Mallory Cohen '17

Senior Theses in Dance: Text, Relationships, and Creative Processes in Performance

Rachel Boggia, Dance, advisor

In this session Laura Pietropaoli and Mallory Cohen present the outcomes of investigations made in collaborative creative processes this semester. The goal of using text-driven movement to convey unique human experiences links together these two thematically different works.

Nevo Polonsky '17

A Mechanistic Comparison of Catalytic Transfer Hydrogenation and Hydrodeoxygenation using Ru/TiO₂ Catalysts

Ryan Nelson, Chemistry, advisor

Biofuels are an emerging plant matter based alternative to fossil fuels. During biofuel synthesis bulky and solid plant molecules are converted to bio-oils, which are not a practical energy source due to high oxygen content. Biofuels can be synthesized by increasing the hydrogen content of bio-oils through a process called upgrading, which uses a catalysts and hydrogen source. Two types of upgrading are hydrodeoxygenation and catalytic transfer hydrogenation which uses H₂ gas and hydrogen donating molecule as hydrogen sources, respectively. Presented is the mechanism of upgrading using CTH with the Ru/TiO₂ catalyst and mechanistic comparisons to previous research on HDO.

Halley Posner '18

The Fourteenth-Century British Archer: New Technology or Appropriation of the Old?

Gerald Bigelow, History, advisor

The fourteenth-century British archer, did he represent a new technology? This is the question I posed while abroad in Bath, England, in my self-designed tutorial, "Medieval Technology and Social Change." To answer this query, I researched topics from the rising dependence on the archer in military tactics through a case study of the Battle of Agincourt to the changing perception of the archer in popular culture personified by Robin Hood. I deduced that although the archer's weapon, the bow, was not novel, the military archer as a deciding factor to win battles was indeed a new technology.

Jenna Powell '19 – see Zofia Ahmad '19

Presenting the World: Geographical Narratives from the Ancient World

Hamish Cameron, Classical and Medieval Studies, advisor

Molly Pritz '17 – see Claire Brown '17

Knowledge and the Public Good: Exploring Intersections of Theory and Practice

Darby Ray, Harvard Center for Community Partnerships, advisor

Bronwyn Purcell '17

The Relationship between Pretend Play and the Socioemotional Development of Preschoolers as a Function of Gender and Birth Order

Georgia Nigro, Psychology, advisor

Play is a charged topic in early childhood education, and researchers are still analyzing which types of play are more strongly associated with which types of development. During pretend play, or any play situation involving some element of pretense, children develop perspective and work through everyday problems, factors I propose should promote children's socioemotional development. However, solitary pretend play may be more isolating and less linked to socioemotional development than social pretend play. This project explores whether or not the amount and complexity of pretend play influence children's socioemotional development. I will also examine these relationships as a function of gender and birth order.

Ali Rabideau '17

Let Our Stories Scatter the Seeds: An Exploration in Communicating the Spirit of the Center for Wisdom's Women

Emily Kane, Sociology, advisor

For this sociology thesis, I have partnered with the Center for Wisdom's Women in downtown Lewiston to explore the impact of the center as understood by those who benefit from its community. I have spent many hours in participant observation, conducting in-depth interviews, and directing group writing exercises to gather stories and perspectives from the women at the center. I have used this knowledge to address the lack of understanding of the center's purpose by those who are outside of its community, experimenting with communicating the importance of the center to others, especially potential financial supporters.

Phathutshedzo Rambau '17

Honey Bee (Apis mellifera) Exposure to Pesticides: Determination of Residual Pesticides in Beeswax and Honey In Maine

Paula Schlax, Chemistry, advisor

Honey bee (*Apis mellifera*) colonies are declining rapidly. Many studies have attributed this colony loss to honey bees' exposure to pesticides. In this study, we determined residual pesticides that are present in bee products: beeswax and honey. We used GC/MS to measure concentrations of Cypermethrin and Bifenthrin and HPLC to measure concentrations of Imidacloprid and Clothianidin. Three of the pesticides were detected within control samples but none have been detected in honey and beeswax samples from Maine.

Dmitriy Redkin '17

Commodity Price Behavior with Focus on Storability

Daniel Riera-Crichton, Economics, advisor

Model predictive accuracy varies by many factors. In particular, we examine the cointegration properties between commodity futures and spot prices, and whether they offer predictive power. We additionally provide an analysis of storability, specifically for sugar, in which an explanation for accurate forecasting may be found. The results suggest that futures have weak predictive power across several commodities. Storability and the presence of cointegration may offer additional forecasting power.

Calvin Reedy '17

Bates Museum of Art Internship

Anthony Shostak, Bates College Museum of Art, advisor

I will talk about my experience interning as a Curatorial Assistant at the Bates Museum of Art.

Duncan Reehl '17

One Hand Clapping: Hearing Zen in the Contemporary Western Art Music Piece, Recueil de pierre et de sable by

Joshua Fineberg

Gina Fatone, Music, advisor

My thesis is an inquiry into the use of the aesthetic, philosophical, and spiritual ideals of Zen Buddhism in Western art music through a case study of "Recueil de pierre et de sable" (1998), by American composer Joshua Fineberg (b. 1969). Drawing on ethnomusicological methods and theories of semiotic music analysis, I perform a cultural music-theoretical/semiotic analysis. I suggest that Fineberg employs compositional elements on the aural/musical, deep-structural, and experiential levels which signify Zen concepts based on his tempered usage of aesthetic concepts associated with Zen such as *wabi* ("unpretentious, rustic beauty") and *mu* ("emptiness").

Azure Reid-Russell '17

Examining Interpersonal Deficits in Borderline

Personality Style: Comparing Attachment and Biosocial Models

Kaitlin White, Psychology, advisor

This study explores the interpersonal dysfunctions found in in borderline personality disorder (BPD) by testing two leading theories about the core constructs of BPD: Linehan's (1993) biosocial theory and Fonagy and Bateman's (2008) theory of attachment insecurity. Two studies investigate if insecure attachment or emotion dysregulation explain the relationship between BPD symptom severity and 1) social cognition and 2) distress in response to laboratory-induced social exclusion. By capturing different aspects of interpersonal functioning, the results of these studies will point to the core constructs of BPD that contribute most to the relationship between BPD symptom severity and relationship problems.

Alison Ricciardi '17

The Structure and Function of Fiber Anatomy in the

Early Seed Plant Order Cycadales

Brett Huggett, Biology, advisor

The leaflet anatomy of cycads, an ancient group of plants with fossils records dating back ~300 million years ago, has been evaluated to better understand the structure and function of fiber tissue. Macerated and sectioned leaves of *Dioon sp.* were examined under scanning electron microscope to view the fiber anatomy, formation, and positioning. Our observations indicate that fibers in *Dioon sp.* are multilaminar rather than gelatinous as previously reported. Results will enhance investigations of the developmental features of a cycad to better understand how these plants have survived in competition with dominant flowering plants.

Bria Riggs '18

Evaluating a Squirrel Monkey Troop in Natural Rehabilitation: An Assessment of Population and Behavior of Saimiri sciureus in Preparation for Relocation from Sumak Allpa to Yasuní National Park, Ecuador

Tina Mangieri, Office of Off-Campus Study, advisor

Natural rehabilitation and translocation of primate species provide the opportunity for recovery of individuals and repopulation of species in the wild. However, there are few successful examples of primate translocation around the world, and no successful cases in Ecuador. This study assesses the population and overall behavioral activity of a troop of *Saimiri sciureus* on Sumak Allpa Island, Orellana, Ecuador, from 6-27 November 2016. This specific troop, referred to as the Yasuní troop, is scheduled to be translocated from Sumak Allpa to Yasuní National Park in March or April of 2017, and would be the first successful translocation of a primate group in Ecuador. Field observations in the natural habitat of *Saimiri sciureus* and at the platform that will be used in the translocation process were used to examine the Yasuní troop's population composition and behavioral activity, and assess whether this troop will be able to withstand the stresses of the translocation process and survive in the wild. The population of the troop was found to be stable, with healthy yearly birth and survival rates, and behavioral budgeting was found to be comparable to that of a wild troop of *Saimiri sciureus*. These observations are strong indicators that the Yasuní troop will be able to successfully function as a wild troop.

Joshua Rines '17 and Sophia Gottlieb '17

Spatially Resolving Mass Distribution in Compact Galaxies

Aleksander Diamond-Stanic, Physics, advisor

Why are galaxies so bad at forming stars? Conflicts between observations and simulations of how efficiently galaxies can collapse cold, dense gas into stars differ an order of magnitude. Scientists turn to processes that inject energy or momentum into galaxies to prevent gas from cooling and forming stars. Our research investigates

whether radiation pressure from stars could produce these jets of cold, dense gas and reduce galactic star formation. Understanding why galaxies struggle to form stars out of normal matter will inform our knowledge of the galactic lifecycle, and resolve the inefficiency dilemma between observations and simulations.

Katharine Rosenthal '17

"Television! Teacher, mother, secret lover":

Consequences of Alcohol and Drug Portrayals in Television and Film on Recreational Substance Use Behaviors and Attitudes

Michael Rocque, Sociology, advisor

This thesis explored how exposure to a higher frequency of both general and positive portrayals of drugs and alcohol in popular movies and television shows affects people's behaviors and attitudes surrounding recreational substance use. Research methods involved statistical analysis of a survey disseminated to current Bates College students and content analysis of popular movies and television shows. Results support the idea that exposure to more portrayals of substances in television and film, regardless of their nature, does correlate with more drinking and drug behavior and more social, recreational, and positive attitudes regarding substance use for both the self and others.

Wade Rosko '17

Understanding the Variability of Indian Monsoons: Combining Data and Models

Rajarshi Saha, Geology and Physics, advisor

The Indian Summer Monsoon, an annual precipitation event over the Indian subcontinent, is a large driver of environmental, political, and social happenings. In this year-long physics thesis, the interannual and intraseasonal precipitation variations of the Indian Summer Monsoon are modeled. Bridging the gap between a deep complex model, and simple model, satellite and reanalysis weather data is used to form a real-world grounded model. Results have been found via the assistance of the Bates High Performance Computing Cluster with the hope to help aid in future weather and climate predictions for monsoonal regions.

Paul Runyambo '17

The Effect of Immigration and Interaction between Immigrants of Different Nationalities

Alexandre Dauge-Roth, French and Francophone Studies, advisor

The geopolitical divide in Central Africa that separates Congo DR, Rwanda, and Burundi has long plagued the region with conflicts. This has caused an increase in the number of immigrants and refugees. My documentary sought out to investigate how these immigrants interact and build communities in a new environment. We conducted interviews with immigrants to ascertain whether their perceived notion of each other has changed and how that have affected their interactions. The investigation shows that immigrants interact better while away from their country's social and political influence. It appears that new social challenges unify them in this environment.

Erik Saberski '17

The Fourier Transform: How This Amazing Tool Works and a Few Applications

Katharine Ott, Mathematics, advisor

Fourier analysis allows us to study fundamental properties of waves. Within the broad area of Fourier analysis, my focus is primarily on the Fourier transform. This tool allows us to take any set of periodic time series data and change it from the time domain to the frequency domain. This allows us to analyze exactly how much of each frequency comprises a specific data set. The first example I explore is a sound wave. Looking at a sound in the time series is just a mess of many sharp waves. However, using the Fourier Transform, I am able to pick out exactly what frequencies of sound are in any given sound wave. I have written a code that can take any sound and identify exactly what frequencies and notes are predominately in that sound. I will also continue to write code that can change the key of any sound and potentially identify music based on its key.

Sophie Samdperil '17

How Do Individuals Use and Navigate the Chilean Spanish Language to Display, Subvert, and Perpetuate Chilean Hegemonic Order?

David George, Spanish, advisor

My Spanish portfolio research, with field work in Chile, examines how linguistic devices such as metaphor, euphemism, dysphemism, taboo, jargon, and dialect relate to Chilean hegemonic structure. How do these language tools and concepts reflect, subvert, and display structures and identities of power as each individual manages and produces language?

Amanda San Roman '17

Rhetorical Performance of a First Gentleman: A Rhetorical Analysis of Bill Clinton's 2016 Democratic National Convention Address

Stephanie Kelley-Romano, Rhetoric, advisor

The role of the president's spouse has shifted over time but one thing has remained constant: They've all been women. What happens when a man attempts to join this previously female-only group? Bill Clinton's 2016 DNC address challenges the status-quo not only with his gender, but also with his history and reputation in the U.S. government.

Andrew Segal '17

The Historical Ethos of Bates College: An Analysis of the Freewill Baptist Faith and Its Impact on Oren B. Cheney, Founder of Bates

Joseph Hall, History, advisor

In this presentation I will explore the ethical foundations of Bates College through an examination of the Freewill Baptist faith. We often celebrate Bates' "progressive" history, especially the fact that the college was open to all students regardless of race, gender, or religious denomination. However, we don't often stop and ask ourselves, "Where did our founder Oren B. Cheney acquire such a radical moral framework?" This presentation analyzes the historical and moral underpinnings of the Freewill Baptist denomination, and ultimately traces a direct link from the faith's founding ethos in the late

eighteenth century to the opening of our radically progressive college in 1855.

William Sheehan '17

Testing Physical Correctness of Fluid Dynamics Simulations

Jeffrey Oishi, Physics, advisor

The Dedalus project is a platform to solve a wide range of differential equations, with specific application in fluid dynamics. In my thesis I have setup a continuous integration and test suite for the Dedalus project. The tests aim to establish correctness standards for problems that often have multiple "correct" answers. The tests provide Dedalus stability and accountability when changes are made to the project.

Lillie Shulman '17

A Universe in Transition: The Future of the Art World in France

Alexandre Dauge-Roth, French and Francophone Studies, advisor

Historically, financial support of the arts in France has been sustained by corporate giving. In contrast, the United States funds the arts largely by individual donors. In my documentary, I offer a new lens into the changing vision of patronage of arts and culture in France. I interview a former gallery assistant, an executive director of a foundation in support of two of Paris's national collections, and a former president-director of two of the nation's most prestigious museums. My work reveals that in tandem with an ever-evolving world, the French philanthropy of the arts is also in a state of transition.

Claire Sickinger '19 – see Samuel Hersh '18

Exploring Dance History: Important Figures and Their Impact

Rachel Boggia, Dance, advisor

Julia Smachlo '17

Influence of Chronic Hypoxia on Developing Respiratory System

Ryan Bavis, Biology, advisor

Environmental conditions can influence the development of the mammalian respiratory system. This study examines whether chronic postnatal hypoxia delays the maturation of the hypoxic ventilatory response (HVR). Rats were born and raised in one of two treatment groups, the Control group (21% O₂) and the hypoxic group (12% O₂). The ventilatory response of both treatment groups was measured during exposure to acute hypoxia. Overall, it appears that chronic hypoxic exposure inhibited the development of a hypoxic response.

Emma Smith '17

Expression and Purification of Ubiquitin-protein E3 Ligases Arih1, Arih2, and DTX3L using E. coli and Bac-to-Bac Baculovirus Expression Systems

Glen Lawson, Chemistry, advisor

The 3C protease encoded by picornaviruses is responsible for effective viral replication and has been shown to reduce infected cell's defense capabilities. The ubiquitin proteasome system (UPS) is able to target the 3C proteases of hepatitis A (HAV) and encephalomyocarditis virus

(EMCV) for polyubiquitination. Ubiquitin protein ligases DTX3L, Arih1, and Arih2 have been shown to tag HAV and EMCV 3C proteases with polyubiquitin chains and these are subsequently recognized and degraded by the 26S proteasome. To isolate each ligase cloning methods and GST fusion proteins were used. The ligases were expressed by cloning into *E. coli*. Cloning was also attempted using Bac-to-Bac Baculovirus Expression System. pGEX-4T-DTX3L, pGEX-4T- Arih1, and pGEX-4T- Arih2 fusion vector constructs were confirmed using agarose gel electrophoresis. The main goal of the project was to express and purify ligases for in vitro examination of the interactions of E3s during ubiquitination.

Monata Song '17

Age Dependent Pattern of Hypoxic Ventilatory Response in Postnatal Japanese Quail

Ryan Bavis, Biology, advisor

The purpose of this study was to observe the hypoxic ventilatory response (HVR) in developing Japanese quails (*Coturnix coturnix*). We used head-body plethysmography as a direct measure of ventilation (frequency and tidal volume). Three age groups of quails (P0, P4, and P7) were exposed to Normoxia (21% O₂) before measuring their HVR to 15 minutes of acute hypoxia. Percent change in ventilation was calculated between baseline and the 1 and 15 minute time points of acute hypoxia. After preliminary data analysis, we found that the P0 and P4 quails are showing a biphasic HVR trend while P7 have a sustained HVR.

Leah Spingarn '17

The Effect of Individuals' Valuation of Moral Foundations and Motivation on Implicit Biases toward Gay and Lesbian Targets

Michael Sargent, Psychology, advisor

Graham, et al. (2009) identified five moral foundations and found that valuations of certain moral dimensions were correlated with liberalism and conservatism. Additional research found relationships between conservatism and higher rates of discriminatory tendencies toward out-groups, compared to liberals. This study investigated whether certain moral foundations would be correlated with implicit bias toward gay and lesbian couples on an implicit association test (IAT). Moreover, half of the participants were exposed to a motivation condition that elucidated the association between the IAT and principles of equality. Motivation was hypothesized to exacerbate the difference between moral foundation valuations and implicit bias.

Daniel Stames '17

Assessing the Effectiveness of Using Typha latifolia and Typha angustifolia as Proxies for Estimating Seasonal Methane Emissions on Maine's Various Southeastern Salt Marshes

Beverly Johnson, Geology, advisor

This study focuses on seasonal methane emissions in four different southeastern Maine salt marshes, where each site is located in a finite salinity regime and contains similar vegetation (*Typha latifolia* and *Typha angustifolia*). The aims of this study were twofold: 1) to test the efficacy of using *Typha* as a proxy for determining seasonal methane emissions, and 2) to determine what degree methane

emissions in regions of *Typha* differ across marshes in close proximity within the same season. The project used static gas chambers to sample CH₄ emissions in four different marshes from May 2016 to September 2016. The methane emissions were measured using a gas chromatograph and flame ionization detector (GC-FID). The study found similar temporal methane fluxes across all four marshes and found the average flux of methane over the sampling season to be 12.7 +/- 8.0 umol/(m²*hr). A notable exception was Little River Marsh, which had higher CH₄ fluxes ranging up to 137.8 +/- 29.6 umol/(m²*hr).

Nathan Stephansky '17

Resistance to Drought in Four New England Hardwood Species

Brett Huggett, Biology, advisor

Water is transported in trees through a vascular system collectively known as xylem. Under drought conditions, xylem can become embolized, resulting in loss of water transport and ultimately death. A comparison of drought resistance in four temperate trees was conducted by measuring xylem vulnerability to embolism in varying tissues from root-to-shoot. Resistance to drought was expected to be lower in xylem of older growth rings and in more distal tissues of the tree. The data show that resistance to drought is less related to age than previously thought and that tissue location does not affect resistance for all species studied.

Katherine Stevenson '17 – see Claire Brown '17

Knowledge and the Public Good: Exploring Intersections of Theory and Practice

Darby Ray, Harward Center for Community Partnerships, advisor

Leah Sturman '17

The Matrix Graphical Realization Problem

Pallavi Jayawant, Mathematics, advisor

In graph theory, a graph is a nonempty set of vertices and set of edges. The degree of a vertex is the number of edges adjacent to the vertex. A joint degree matrix of a graph is a kxk matrix describing the number of edges between vertices of degrees i and j for i and j from 1 to k. The matrix graphical realization problem asks: for a matrix M, is there a graph whose joint degree matrix is M? This poster examines necessary and sufficient conditions for a matrix to be a joint degree matrix and consequences of realizability.

Anna Sucsy '17

Comparing the Social Integration of Franco-Africans and French Canadians in Lewiston, ME

Alexandre Dauge-Roth, French and Francophone Studies

Lewiston is becoming home to an increasing number of Franco-African immigrants, refugees, and asylum seekers. Lewiston has a rich Franco-American history, beginning at the end of the nineteenth century, and the recent arrival of Franco-African immigrants marks the beginning of an unexpected revitalization of French language. Interviewing four local Francophones, I compared the historical social integration of French Canadians and the current integration

of Franco-Africans within the Lewiston community. I argue that the Catholic Church historically played a valuable role in the integration of French Canadians, but that this form of assistance is unavailable to many Franco-Africans today.

Yacine Sylla '17

Isotopic Evidence for Nutrient Cycling in Two *Zostera marina* Meadows in Cape Cod, MA

Beverly Johnson, Geology, advisor

The causes of nutrient cycling at Hog Island, Pleasant Bay, and Duck Harbor, Wellfleet, MA, are determined through an analysis of carbon, nitrogen, and sulfur isotopes. A temporal variation analysis looks at both sites throughout the years 2003 to 2016. A spatial analysis considers Duck Harbor to be the control site whereas Pleasant Bay is assumed to be polluted. The essence of this study pertains to the combined use of carbon, nitrogen, and sulfur isotopes in eelgrass studies which is a powerful tool that can increase our knowledge on nutrient status and growth conditions in nearshore systems.

Ariscell Tavarez '17 – see Chris Crum '17

Off-Campus Study: Homestays while Abroad

David Das, Office of Off-Campus Study, advisor

Zaynab Tawil '17

Creative Thesis Reading: Poetry

Eden Osucha, English, advisor

I will read a selection of poetry featured in my creative thesis. The poems explore themes of war, family, love, crisis, memory, and the intersecting relationships among them.

Melanie Tayer '17

The Family-oriented Jury: Families of Trial Participants and their Impact on Jury Decision Making

Amy Douglass, Psychology, advisor

This study aims to address the impact of supporters of trial participants on jury decisions. Research suggests that juries are susceptible to bias and atmospheric factors in the courtroom, especially when the case is presented in a complex manner (Cooper and Neuhaus, 2000). One such factor that has not been studied is evidence of family support. Research shows that empathic evaluations of people are increased when family connections are made salient (Sundby, 2003; Sjoberg, 2015.) I hypothesize that defendants who have many family members present compared with defendants who have fewer family members present in the courtroom will evoke an empathic response, which should translate into a more lenient sentence. When many family members are present for the victim, the empathic response generated for that individual should produce a harsher sentence for the defendant. I predict that these effects will be heightened in a complex case scenario.

Students in Theater 360, Theater for Social Change, and other students and staff

Performance: My America Too

Katalin Vecsey, Theater, and Justin Moriarty, Theater, advisors

My America Too was originally produced by Center Stage in Baltimore, MD. The series of six short plays set around a kitchen table were filmed on the street at locations of high-

profile killings in Sanford, FL; Cleveland, OH; Ferguson, MO; Staten Island, NY; Baltimore, MD, and Charleston, SC. An independent study course, Theater for Social Change, uses theorist Paulo Freire's influential work, *Pedagogy of the Oppressed*, research findings on the Black Lives Matter movement, and Applied Theater Techniques in the service of social change to produce this collaborative creation including students, staff, and faculty. Nonstudent actors include Mary Meserve, Registrar, and James Reese, Associate Dean for International Programs.

Sarah Tobin '17

Synthesis of the Xylose Building Block in the O-Mannosylated m3 Glycan

Jennifer Koviach-Côté, Chemistry, advisor

Glycosylation is a crucial post-translational modification of proteins that yields the addition of oligosaccharides to proteins. *O*-mannosylation is a rare form of *O*-glycosylation where a mannose residue on the oligosaccharide is linked to a serine or threonine residue on the protein. Abnormalities of *O*-mannosylation result in congenital muscular dystrophies, referred to as dystroglycanopathies. The overall goal of the project is to synthesize the m3 glycan by preparing the xylose-glucuronic acid repeat and the ribo-5P-dimer. Specifically, my project focuses on the synthesis of the xylose building block of the m3 glycan.

Joseph Tocci '17

Synthetic Approach for the Ligand Binding Moiety Scaffold, Rbo5P, in a-Dystroglycan

Jennifer Koviach-Côté, Chemistry, advisor

O-mannosylated glycosylation of proteins is a rare post-translational modification that underlies many biological processes. *a*-Dystroglycan (*a*-DG) acts as a receptor for synaptic and membrane protein interactions. Abnormal glycosylation of *a*-DG is also responsible for muscular dystrophy. An important feature of *a*-DG is Rbo5P, which forms a tandem-repeating unit. Recent research has shown that common muscular dystrophy genetic mutations lead to inability to create the Rbo5P linker. The purpose of this research is to develop a de novo synthesis of Rbo5P beginning with D-ribose.

Hannah Tolan '17

The Impact of Priming College Students to Think in an Individualist or Collectivist Manner on Feelings toward the Myers-Briggs Type Indicator and Career Planning
Rebecca Fraser-Thill, Psychology, advisor

Research suggests that the Myers-Briggs Type Indicator (MBTI) is a useful and popular tool for career development and planning (Bubbenzer, 1990). The current study aimed to determine if priming college students to think about themselves in an individualist or collectivist manner before taking the MBTI would have an effect on how they feel about career planning and the MBTI assessment. The participants were randomly assigned to either the individual or collective self prime and it was predicted that participants who were individually primed would score higher on both the career decision self-efficacy scale (short

form) and the MBTI perceived helpfulness questionnaire. Results indicated that the prime did have a significant effect.

Katherine Traquina '17

Sexual Violence in Early Tibetan Buddhist Conversion Lore

Alison Melnick, Religious Studies, advisor

Buddhism is often considered a religion of peace; Buddhism is thought to be a religion which promotes gender equity through its ideals of enlightenment, in that enlightenment is possible for all. It is known as a religion that is known to combat all violence and, in fact, perpetuates the nonviolence of all sentient beings. However, while such values are present in Buddhist practice, this thesis will attempt to disprove the aforementioned Western contemporary narrative of nonviolence in Buddhist tradition by highlighting the sexually violent rhetoric of Buddhist conversion stories and the denouncement of the feminine in Buddhist history. In order to demonstrate this contradiction, this thesis examines the gendered violence that is central to the Buddhist folklore of Tibet and the sexual ideals of Buddhist thought in early Tibet.

Alex Ulin '17

Use of Chromatin Immunoprecipitation and qPCR in 24 Hours-post-fertilization Zebrafish (Danio rerio) Embryos to Show Direct Regulation of nrf genes by Ahr1B

Larissa Williams, Biology, advisor

Aryl-hydrocarbon receptor (Ahr) and nuclear factor-erythroid-2 (nfe2) related factors (*nrf*s) are transcription factors which are involved in developmental regulatory processes during periods of oxidative stress. Using 24 hours-post-fertilization (hpf) zebrafish embryos, the interactions between Ahr1B and *nrf*s are being assessed. Morpholino knockdown of Ahr1B in the presence of a strong Ahr ligand, TCDD, suggest that Ahr1B upregulates most *nrf* genes. Using chromatin immunoprecipitation (ChIP) followed by qPCR, it is hypothesized that there is direct regulation of particular *nrf* genes by Ahr1B binding on cis-promoter xenobiotic response elements (XRE). Results will further reveal the functions of the *nrf* family transcription factors.

Devin Ullerick '17

Breaking the Mold: An Analysis of the "Male Gaze" in Rainer Werner Fassbinder's Films of the New German Cinema

Jakub Kazecki, German, advisor

I am focusing on and analyzing two of the films from the acclaimed German director Rainer Werner Fassbinder, *Ali: Fear Eats the Soul* (1974) and *The Merchant of Four Seasons* (1971). They highlight how Fassbinder departed from the "male gaze," a term that was first proposed by Laura Mulvey in *Visual and other Pleasures* (1988). I argue that Fassbinder uses this gaze in shots containing secondary characters to establish a contrast with how he frames his protagonists within the scene. The two films contain "castrated-male" protagonists and function especially well as examples for two types of gaze that Fassbinder uses.

Desirae Valentin '17

Maine Municipal Wastewater Treatment: The Use of Anaerobic Digestion in Greenhouse Gas Mitigation
John Smedley, Physics, advisor

This research investigates greenhouse mitigation through anaerobic digestion in wastewater treatment facilities. These facilities are often responsible for significant amounts of electricity consumption leading to higher rates of greenhouse gas emissions. In utilizing anaerobic digestion, a process that creates methane from organic materials, facilities are able to reduce their dependence on external energy sources and mitigate greenhouse gases. In this study, an analysis of data provided by the Lewiston-Auburn Water Pollution Control Authority was done to estimate greenhouse gases produced by the State of Maine's wastewater treatment facilities that use traditional methods and their reductions when using internally produced methane and cogeneration facilities.

Michael Varner '17

Vector Autoregressions with Machine Learning
Nathan Tefft, Economics, advisor

Vector autoregressions (VARs) have been used over the past thirty-five years to analyze complex dynamic systems. In this project, I look at how using supervised machine learning models in place of ordinary least squares will affect the accuracy of impulse responses generated from a VAR. I compare these impulse responses using Monte Carlo simulations. This research will identify scenarios in which the machine learning VARs will outperform their ordinary least squares counterparts. Lastly, I use these models to estimate the effects of monetary policy on the real economy. Overall, I find that the machine learning VARs give more conservative estimates than the traditional methods.

Jessica Vocaturo '17

Characterizations of Waterboarding: Media-Government Relations in the Post-9/11 Era

William d'Ambruoso, Politics, advisor

In 2010, the Harvard Kennedy School released a study comparing American print media's characterizations of waterboarding in print news reports during the pre- and post-9/11 eras. The study revealed a sudden, empirical shift away from a century-long journalistic practice of characterizing waterboarding as torture in print news reports. What explains this shift? Through qualitative analysis of the factors contributing to this shift, I demonstrate that post-9/11, political and social circumstances require the adoption of an alternative framework through which media-government relations ought to be understood. The alternative framework I propose requires us to study media-government relations as symbiotic in nature.

Raissa Vodounon '17

Combating Medication Misuse: Pictograms for Safe Medication Use and Disposal

Karen Palin, Biology, advisor

According to the Centers for Disease Control, sales of prescription opioids in the United States almost quadrupled

from 1999 to 2014, although there was no overall change in pain reported by Americans over this period. Studies have shown that the number of deaths and accidents in the United States related to use of prescription and over-the-counter medications is directly proportional to the availability of these medications. A recent study by the Institute on Drug Abuse recorded a 2.8-fold increase from 2001 to 2014 in total number of overdose deaths from prescription drugs alone. Maine is a rural state with a smaller and older population and has fewer resources to deal with the influx of drug availability compared with other states with larger metropolitan areas. Safe disposal of medications is an important way to begin to deal with medication misuse. Studies have shown that the greatest risk factors for misuse of medications and noncompliance with medication use are older age, low health literacy, and lack of supervision of medication use. Research has suggested that pictograms are an effective way to increase understanding about medication use and improve overall adherence to medication directions. This study examines the use of locally developed pictograms to improve safe medication use by New Mainers. Community partners for this work included Healthy Androscoggin, Bedard Pharmacy, and the B Street Health Center.

Cormac Walsh '17

A Review of Designer Steroids and in vitro Liver Toxicity of Dietary Supplements Containing Dymethazine and Methylstenbolone

T. Glen Lawson, Chemistry, advisor

Many nutritional supplements contain androgen precursors or active anabolic androgenic steroids. These supplements, called "designer steroids," were made in order to circumvent controlled substance laws. One side effect of these supplements is hepatotoxicity. To build on case studies that suggest the danger of these supplements, immortalized human liver cells were cultured and put in the presence of nutritional supplements containing the legal designer steroids "Dymethazine" and "Methylstenbolone" at various concentrations for 24 hours. Toxicity was measured using a trypan blue exclusion test and LC50 values were calculated for the supplements and compared to that of acetaminophen to show relative toxicities.

Danielle Ward '20 – see Ted Burns '19

Reading Women's Writing: England, Japan, and Latin America

Stephanie Pridgeon, Spanish; Joanna Sturiano, Japanese; and Myra Wright, English advisors

Gabriel Whitehead '17

Comparative Analysis of Building Thermal Efficiency at Bates College

Rajarshi Saha, Geology and Physics, advisor

Bates College currently employs steam heating in some variation throughout the entire campus. These systems are designed to turn on or off based on outdoor temperatures and have no way to differentiate individual building's responses to the same amount of heating. In order to determine the unique behavior of each building due to a change in applied heating so that the school may determine

optimal set backs for each building individually and reduce wasted energy, we will analyze indoor and outdoor temperatures and determine unique heat flow coefficients using installed temperature sensors to compare the thermal efficiencies of each building independently.

Ryan Whittemore '19 – see **Matthew Bodwell '18**
The Comparative Politics of Climate Change
James Richter, Politics, advisor

Gwenyth Williams '17
Paleoenvironmental Reconstruction from the Sediment Record of the Varved Proglacial Linnévatnet, Svalbard, Norwegian High Arctic
Michael Retelle, Geology, advisor

Two sediment cores were collected from a proglacial lake, Linnévatnet, in the high arctic environment of Svalbard, Norway. The seasonal sediment deposits found in the cores archive a record of climate and environmental change for the Linné Valley throughout the past two centuries, a period of change from the cold Little Ice Age to the present warming conditions. Analyses of the physical and chemical properties of the long-term sedimentation record constrain sediment origins and environmental factors, allowing for the development of a regional paleoenvironmental reconstruction.

Hannah Wilson '17
Putting the "Tree" into Tree Street Youth: Mental Health, Green Space, and Increasing Access to Natural Environments

Nancy Kleckner, Biology, advisor
Maine is abundant with natural beauty. However, many low-income youth living in Lewiston, ME, lack access to parks and green spaces. Poverty acts as a toxic stressor yet there is a growing body of literature showing that exposure to green space can relieve stress, improve affect, and moderate the impact of stressful life events. This research was synthesized and compiled into an informational packet for use by Tree Street Youth. This research will help strengthen any outdoor-related grant funds that Tree Street seeks and allow more of Tree Street Youth students the opportunity to explore the great outdoors.

Chase Winham '20 and Will Murray '20
A War on Social Networks
Denis Sweet, Extradisciplinary Studies, advisor
The twenty-first century is an age of digital unity. Due to the advent of social networks, communication is now widely accessible, remarkably simple, and startling ubiquitous. Though this extreme interconnectivity might enable us in some ways, it also opens the door to manipulation. Terrorist organizations like ISIS thrive on our hyperconnectivity; they have harnessed the power of the internet, turning the World Wide Web into a battle ground for digital propaganda, systematic recruitment, and strategic manipulation. Despite the organization's Middle Eastern and North African origins, ISIS has used social networks as stepping stones to transcend geographic boundaries and forge a terrorist organization of the

technological age. Consequentially, ISIS has shaped the internet into perhaps the most lethal military strategy of contemporary warfare.

Matthew Winter '18 – see **Chris Crum '17**
Off-Campus Study: Homestays while Abroad
David Das, Office of Off-Campus Study, advisor

Julia Yankelowitz '17 – see **Hannah Chipman '17**
Misconceptions of Bilingualism: Unpacking the Overdiagnosis of Spanish-speaking English Language Learners as Learning Disabled and Speech and Language Impaired
Michael Rocque, Sociology, advisor

Bruno Zicarelli '17
Major Histocompatibility Complex (MHC) Class IIA in Storm Petrels

Donald Dearborn, Biology, advisor
Recently, the major histocompatibility complex (MHC) has emerged as a prominent system for studying mate choice, molecular evolution, and population genetics. As the most polymorphic loci known in vertebrates, the MHC is very well understood, particularly in mammals. Much less is known about the non-mammalian MHC, specifically the class IIA region. In mammals, the class IIA region of the peptide-binding site is typically non-polymorphic. However, recent studies have shown the presence of a high degree of polymorphism at the class IIA locus in several non-mammalian and mammalian vertebrates, calling into question our understanding of the MHC class II gene. Here, I describe the development of genetic tools for characterizing variation at Class IIA in a non-model bird species.

Kyle Zollo-Venecek '17
The Relationship of Phosphorus, Iron, and Aluminum in the Lake Auburn Water Reservoir
Arienne Bazilio, Chemistry, advisor

Lake Auburn is a major drinking water source for the Lewiston and Auburn communities, supplying approximately 60,000 residents. The water utility was granted a filtration waiver from the Environmental Protection Agency (EPA) as it is a pristine source. In 2011, unprecedented algal blooms and rising phosphorus (P) levels threatened the quality of the source. Studies in similar oligotrophic lakes showed relationships between Iron (Fe), aluminum (Al), and the dissolution of sedimentary P into the water column when the source of P was internal (i.e., from within the lake). This research aims to measure the profile concentrations of P, Fe, and Al in Lake Auburn. It also aims to distinguish the different forms – particulate, colloidal, or dissolved – in which these elements are found. Results could help identify sources of P, and direct future research and management strategies.